U.S. Access Board

Information and Communication Technology

Revised 508 Standards and 255 Guidelines

About the ICT Accessibility 508 Standards and 255 Guidelines

These standards address access to information and communication technology (ICT) under Section 508 of the Rehabilitation Act and Section 255 of the Communications Act.

Section 508 of the Rehabilitation Act *(https://www.access-board.gov/law/ra.html)* charges the Access Board with developing and promulgating this rule. The statute also charges the Access Board with providing Technical Assistance on Section 508, which is provided through webinars *(https://www.access-board.gov/webinars/)* , trainings *(https://www.access-board.gov/training/)* , and in close collaboration with GSA and materials available from Section508.gov *(https://www.section508.gov)*.

Section 508 requires access to ICT developed, procured, maintained, or used by federal agencies. Examples include computers, telecommunications equipment, multifunction office machines such as copiers that also operate as printers, software, websites, information kiosks and transaction machines, and electronic documents. The Section 508 Standards, which are part of the Federal Acquisition Regulation, ensure access for people with physical, sensory, or cognitive disabilities.

The Section 255 Guidelines cover telecommunications equipment and customer-premises equipment — such as telephones, cell phones, routers, set-top boxes, and computers with modems, interconnected Voice over Internet Protocol products, and software integral to the operation of telecommunications function of such equipment.

Background

- January 22, 2018 – The Board issues correction to the final rule *(https://federalregister.gov/d/2018-00848)* to restore provisions for TTY access.
- January 18, 2017 – The Board issues the final rule *(https://federalregister.gov/d/2017-00395)*, docket ATBCB-2015-0002-014 *(https://www.regulations.gov/document/ATBCB-2015-0002-0144)*.
- February 27, 2015 – The Board ICT proposed rule *(https://federalregister.gov/d/2015-03467)* for public comment, docket ATBCB-2015-0002 *(https://www.regulations.gov/docket/ATBCB-2015-0002)*.
- December 8, 2011 – The Board issues a revised draft proposed rule *(https://federalregister.gov/d/2011-31462)* for public comment, docket ATBCB-2011-0007 *(https://www.regulations.gov/docket/ATBCB-2011-0007)*.
- March 22, 2010 – The Board releases a draft proposed rule *(https://federalregister.gov/d/2010-6245)* for public comment, docket ATBCB-2010-0001 *(https://www.regulations.gov/docket/ATBCB-2010-0001)*.
- April 3, 2008 – The Advisory Committee presents its final report to the Board.
- July 6, 2006 – The Board organizes TEITAC *(https://federalregister.gov/d/E6-10562)*, the Telecommunications and Electronic and Information Technology Advisory Committee, to assist in updating the Section 508 Standards and Telecommunications Act Guidelines.
- December 21, 2000 – The Board issues the original Section 508 Standards *(https://federalregister.gov/d/00-32017)*.
- February 3, 1998 – The Board publishes the original Telecommunications Act Accessibility Guidelines *(https://federalregister.gov/d/98-2414)*.

Additional Resources

- Section508.gov *(https://section508.gov)* — GSA's Government-wide IT Accessibility Program
- Section 508 of the Rehabilitation Act (29 U.S.C. §794d) *(https://www.access-board.gov/about/law/ra.html#section-508-federal-electronic-and-information-technology)*
- Final Regulatory Impact Analysis (FRIA *(https://www.access-board.gov/ict/fria.html)*)
- Comparison Table of WCAG 2.0 to Original 508 Standards *(https://www.access-board.gov/ict/wcag2ict.html)*
- Mapping of WCAG 2.0 to Functional Performance Criteria *(https://www.access-board.gov/ict/wcagtofpc.html)*
- ICT Baseline Portfolio *(https://ictbaseline.access-board.gov)* Accessibility Testing

Appendix A to Part 1194 – Section 508 of the Rehabilitation Act: Application and Scoping Requirements

508 Chapter 1: Application and Administration

E101 General

E101.1 Purpose

These Revised 508 Standards, which consist of 508 Chapters 1 and 2 (Appendix A), along with Chapters 3 through 7 (Appendix C), contain scoping and technical requirements for information and communication technology (ICT) to ensure accessibility and usability by individuals with disabilities. Compliance with these standards is mandatory for Federal agencies subject to Section 508 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794d).

E101.2 Equivalent Facilitation

The use of an alternative design or technology that results in substantially equivalent or greater accessibility and usability by individuals with disabilities than would be provided by conformance to one or more of the requirements in Chapters 4 and 5 of the Revised 508 Standards is permitted. The functional performance criteria in Chapter 3 shall be used to determine whether substantially equivalent or greater accessibility and usability is provided to individuals with disabilities.

E101.3 Conventional Industry Tolerances

Dimensions are subject to conventional industry tolerances except where dimensions are stated as a range with specific minimum or maximum end points.

E101.4 Units of Measurement

Measurements are stated in metric and U.S. customary units. The values stated in each system (metric and U.S. customary units) may not be exact equivalents, and each system shall be used independently of the other.

E102 Referenced Standards

E102.1 Application

The specific editions of the standards listed in Chapter 7 are incorporated by reference into 508 Chapter 2 (Scoping Requirements) and Chapters 3 through 6 to the prescribed extent of each such reference. Where conflicts occur between the Revised 508 Standards and the referenced standards, these Revised 508 Standards apply.

E103 Definitions

E103.1 Terms Defined in Referenced Standards

Terms defined in referenced standards and not defined in E103.4 shall have the meaning as defined in the referenced standards.

E103.2 Undefined Terms

Any term not defined in E103.4 or in referenced standards shall be given its ordinarily accepted meaning in the sense that the context implies.

E103.3 Interchangeability

Words, terms, and phrases used in the singular include the plural and those used in the plural include the singular.

E103.4 Defined Terms

For the purpose of the Revised 508 Standards, the terms defined in E103.4 have the indicated meaning.

Agency

Any agency or department of the United States as defined in 44 U.S.C. 3502, and the United States Postal Service.

Alteration

A change to existing ICT that affects interoperability, the user interface, or access to information or data.

Application.

Software designed to perform, or to help the user to perform, a specific task or tasks.

Assistive Technology (AT)

Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Audio Description.

Narration added to the soundtrack to describe important visual details that cannot be understood from the main soundtrack alone. Audio description is a means to inform individuals who are blind or who have low vision about visual content essential for comprehension. Audio description of video provides information about actions, characters, scene changes, on-screen text, and other visual content. Audio description supplements the regular audio track of a program. Audio description is usually added during existing pauses in dialogue. Audio description is also called “video description” and “descriptive narration”.

Authoring Tool

Any software, or collection of software components, that can be used by authors, alone or collaboratively, to create or modify content for use by others, including other authors.

Closed Functionality

Characteristics that limit functionality or prevent a user from attaching or installing assistive technology. Examples of ICT with closed functionality are self-service machines, information kiosks, set-top boxes, fax machines, calculators, and computers that are locked down so that users may not adjust settings due to a policy such as Desktop Core Configuration.

Content

Electronic information and data, as well as the encoding that defines its structure, presentation, and interactions.

Document

Logically distinct assembly of content (such as a file, set of files, or streamed media) that: functions as a single entity rather than a collection; is not part of software; and does not include its own software to retrieve and present content for users. Examples of documents include, but are not limited to, letters, email messages, spreadsheets, presentations, podcasts, images, and movies.

Existing ICT

ICT that has been procured, maintained or used on or before January 18, 2018.

Hardware

A tangible device, equipment, or physical component of ICT, such as telephones, computers, multifunction copy machines, and keyboards.

Information Technology

Shall have the same meaning as the term “information technology” set forth in 40 U.S.C. 11101(6).

Information and Communication Technology (ICT)

Information technology and other equipment, systems, technologies, or processes, for which the principal function is the creation, manipulation, storage, display, receipt, or transmission of electronic data and information, as well as any associated content. Examples of ICT include, but are not limited to: computers and peripheral equipment; information kiosks and transaction machines; telecommunications equipment; customer premises equipment; multifunction office machines; software; applications; Web sites; videos; and, electronic documents.

Keyboard

A set of systematically arranged alphanumeric keys or a control that generates alphanumeric input by which a machine or device is operated. A keyboard includes tactilely discernible keys used in conjunction with the alphanumeric keys if their function maps to keys on the keyboard interfaces.

Label

Text, or a component with a text alternative, that is presented to a user to identify content. A label is presented to all users, whereas a name may be hidden and only exposed by assistive technology. In many cases, the name and the label are the same.

Menu

A set of selectable options.

Name

Text by which software can identify a component to the user. A name may be hidden and only exposed by assistive technology, whereas a label is presented to all users. In many cases, the label and the name are the same. Name is unrelated to the name attribute in HTML.

Non-Web Document

A document that is not: a Web page, embedded in a Web page, or used in the rendering or functioning of Web pages.

Non-Web Software

Software that is not: a Web page, not embedded in a Web page, and not used in the rendering or functioning of Web pages.

Operable Part

Hardware-based user controls for activating, deactivating, or adjusting ICT.

Platform Accessibility Services

Services provided by a platform enabling interoperability with assistive technology. Examples are Application Programming Interfaces (API) and the Document Object Model (DOM).

Platform Software

Software that interacts with hardware or provides services for other software. Platform software may run or host other software, and may isolate them from underlying software or hardware layers. A single software component may have both platform and non-platform aspects. Examples of platforms are: desktop operating systems; embedded operating systems, including mobile systems; Web browsers; plug-ins to Web browsers that render a particular media or format; and sets of components that allow other applications to execute, such as applications which support macros or scripting.

Programmatically Determinable

Ability to be determined by software from author-supplied data that is provided in a way that different user agents, including assistive technologies, can extract and present the information to users in different modalities.

Public Facing

Content made available by an agency to members of the general public. Examples include, but are not limited to, an agency Web site, blog post, or social media pages.

Real-Time Text (RTT)

Communications using the transmission of text by which characters are transmitted by a terminal as they are typed. Real-time text is used for conversational purposes. Real-time text also may be used in voicemail, interactive voice response systems, and other similar application.

Revised 508 Standards

The standards for ICT developed, procured, maintained, or used by agencies subject to Section 508 of the Rehabilitation Act as set forth in 508 Chapters 1 and 2 (36 CFR part 1194, Appendix A), and Chapters 3 through 7 (36 CFR part 1194, Appendix C).

Software

Programs, procedures, rules, and related data and documentation that direct the use and operation of ICT and instruct it to perform a given task or function. Software includes, but is not limited to, applications, non-Web software, and platform software.

Software Tools

Software for which the primary function is the development of other software. Software tools usually come in the form of an Integrated Development Environment (IDE) and are a suite of related products and utilities. Examples of IDEs include Microsoft® Visual Studio®, Apple® Xcode®, and Eclipse Foundation Eclipse®.

Telecommunications

The signal transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received.

Terminal

Device or software with which the end user directly interacts and that provides the user interface. For some systems, the software that provides the user interface may reside on more than one device such as a telephone and a server.

Text

A sequence of characters that can be programmatically determined and that expresses something in human language.

TTY

Equipment that enables interactive text based communications through the transmission of frequency-shift-keying audio tones across the public switched telephone network. TTYs include devices for real-time text communications and voice and text intermixed communications. Examples of intermixed communications are voice carry over and hearing carry over. One example of a TTY is a computer with TTY emulating software and modem.

Variable Message Signs (VMS)

Non-interactive electronic signs with scrolling, streaming, or paging-down capability. An example of a VMS is an electronic message board at a transit station that displays the gate and time information associated with the next train arrival.

Voice over Internet Protocol (VoIP)

A technology that provides real-time voice communications. VoIP requires a broadband connection from the user's location and customer premises equipment compatible with Internet protocol.

Web page

A non-embedded resource obtained from a single Universal Resource Identifier (URI) using HyperText Transfer Protocol (HTTP) plus any other resources that are provided for the rendering, retrieval, and presentation of content.

508 Chapter 2: Scoping Requirements

E201 Application

E201.1 Scope

ICT that is procured, developed, maintained, or used by agencies shall conform to the Revised 508 Standards.

E202 General Exceptions

E202.1 General

ICT shall be exempt from compliance with the Revised 508 Standards to the extent specified by E202.

E202.2 Legacy ICT

Any component or portion of existing ICT that complies with an earlier standard issued pursuant to Section 508 of the Rehabilitation Act of 1973, as amended (as republished in Appendix D), and that has not been altered on or after January 18, 2018, shall not be required to be modified to conform to the Revised 508 Standards.

E202.3 National Security Systems

The Revised 508 Standards do not apply to ICT operated by agencies as part of a national security system, as defined by 40 U.S.C. 11103(a).

E202.4 Federal Contracts

ICT acquired by a contractor incidental to a contract shall not be required to conform to the Revised 508 Standards.

E202.5 ICT Functions Located in Maintenance or Monitoring Spaces

Where status indicators and operable parts for ICT functions are located in spaces that are frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment, such status indicators and operable parts shall not be required to conform to the Revised 508 Standards.

E202.6 Undue Burden or Fundamental Alteration

Where an agency determines in accordance with E202.6 that conformance to requirements in the Revised 508 Standards would impose an undue burden or would result in a fundamental alteration in the nature of the ICT, conformance shall be required only to the extent that it does not impose an undue burden, or result in a fundamental alteration in the nature of the ICT.

E202.6.1 Basis for a Determination of Undue Burden

In determining whether conformance to requirements in the Revised 508 Standards would impose an undue burden on the agency, the agency shall consider the extent to which conformance would impose significant difficulty or expense considering the agency resources available to the program or component for which the ICT is to be procured, developed, maintained, or used.

E202.6.2 Required Documentation

The responsible agency official shall document in writing the basis for determining that conformance to requirements in the Revised 508 Standards constitute an undue burden on the agency, or would result in a fundamental alteration in the nature of the ICT. The documentation

shall include an explanation of why and to what extent compliance with applicable requirements would create an undue burden or result in a fundamental alteration in the nature of the ICT.

E202.6.3 Alternative Means

Where conformance to one or more requirements in the Revised 508 Standards imposes an undue burden or a fundamental alteration in the nature of the ICT, the agency shall provide individuals with disabilities access to and use of information and data by an alternative means that meets identified needs.

E202.7 Best Meets

Where ICT conforming to one or more requirements in the Revised 508 Standards is not commercially available, the agency shall procure the ICT that best meets the Revised 508 Standards consistent with the agency's business needs.

E202.7.1 Required Documentation

The responsible agency official shall document in writing: (a) the non-availability of conforming ICT, including a description of market research performed and which provisions cannot be met, and (b) the basis for determining that the ICT to be procured best meets the requirements in the Revised 508 Standards consistent with the agency's business needs.

E202.7.2 Alternative Means

Where ICT that fully conforms to the Revised 508 Standards is not commercially available, the agency shall provide individuals with disabilities access to and use of information and data by an alternative means that meets identified needs.

E203 Access to Functionality

E203.1 General

Agencies shall ensure that all functionality of ICT is accessible to and usable by individuals with disabilities, either directly or by supporting the use of assistive technology, and shall comply with E203. In providing access to all functionality of ICT, agencies shall ensure the following:

A. That Federal employees with disabilities have access to and use of information and data that is comparable to the access and use by Federal employees who are not individuals with disabilities; and
B. That members of the public with disabilities who are seeking information or data from a Federal agency have access to and use of information and data that is comparable to that provided to members of the public who are not individuals with disabilities.

E203.2 User Needs

When agencies procure, develop, maintain or use ICT they shall identify the needs of users with disabilities to determine:

1. How users with disabilities will perform the functions supported by the ICT; and
2. How the ICT will be developed, installed, configured, and maintained to support users with disabilities.

E204 Functional Performance Criteria

E204.1 General

Where the requirements in Chapters 4 and 5 do not address one or more functions of ICT, the functions not addressed shall conform to the Functional Performance Criteria specified in Chapter 3.

E205 Electronic Content

E205.1 General

Electronic content shall comply with E205.

E205.2 Public Facing

Electronic content that is public facing shall conform to the accessibility requirements specified in E205.4.

E205.3 Agency Official Communication

Electronic content that is not public facing shall conform to the accessibility requirements specified in E205.4 when such content constitutes official business and is communicated by an agency through one or more of the following:

A. An emergency notification;
B. An initial or final decision adjudicating an administrative claim or proceeding;
C. An internal or external program or policy announcement;
D. A notice of benefits, program eligibility, employment opportunity, or personnel action;
E. A formal acknowledgement of receipt;
F. A survey questionnaire;
G. A template or form;
H. Educational or training materials; or
I. Intranet content designed as a Web page.

EXCEPTION: Records maintained by the National Archives and Records Administration (NARA) pursuant to Federal recordkeeping statutes shall not be required to conform to the Revised 508 Standards unless public facing.

E205.4 Accessibility Standard

Electronic content shall conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1).
EXCEPTION: Non-Web documents shall not be required to conform to the following four WCAG 2.0 Success Criteria: 2.4.1 Bypass Blocks, 2.4.5 Multiple Ways, 3.2.3 Consistent Navigation, and 3.2.4 Consistent Identification.

E205.4.1 Word Substitution when Applying WCAG to Non-Web Documents

For non-Web documents, wherever the term “Web page” or “page” appears in WCAG 2.0 Level A and AA Success Criteria and Conformance Requirements, the term “document” shall be substituted for the terms “Web page” and “page”. In addition, in Success Criterion in 1.4.2, the phrase “in a document” shall be substituted for the phrase “on a Web page”.

E206 Hardware

E206.1 General

Where components of ICT are hardware and transmit information or have a user interface, such components shall conform to the requirements in Chapter 4.

E207 Software

E207.1 General

Where components of ICT are software and transmit information or have a user interface, such components shall conform to E207 and the requirements in Chapter 5.
EXCEPTION: Software that is assistive technology and that supports the accessibility services of the platform shall not be required to conform to the requirements in Chapter 5.

E207.2 WCAG Conformance

User interface components, as well as the content of platforms and applications, shall conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1).
EXCEPTIONS:

1. Software that is assistive technology and that supports the accessibility services of the platform shall not be required to conform to E207.2.
2. Non-Web software shall not be required to conform to the following four Success Criteria in WCAG 2.0: 2.4.1 Bypass Blocks; 2.4.5 Multiple Ways; 3.2.3 Consistent Navigation; and 3.2.4 Consistent Identification.
3. Non-Web software shall not be required to conform to Conformance Requirement 3 Complete Processes in WCAG 2.0.

E207.2.1 Word Substitution when Applying WCAG to Non-Web Software

For non-Web software, wherever the term “Web page” or “page” appears in WCAG 2.0 Level A and AA Success Criteria and Conformance Requirements, the term “software” shall be substituted for the terms “Web page” and “page”. In addition, in Success Criterion in 1.4.2, the phrase “in software” shall be substituted for the phrase “on a Web page.”

E207.3 Complete Processes for Non-Web Software

Where non-Web software requires multiple steps to accomplish an activity, all software related to the activity to be accomplished shall conform to WCAG 2.0 as specified in E207.2.

E208 Support Documentation and Services

E208.1 General

Where an agency provides support documentation or services for ICT, such documentation and services shall conform to the requirements in Chapter 6.

Appendix B to Part 1194 – Section 255 of the Communications Act: Application and Scoping Requirements

255 Chapter 1: Application and Administration

C101 General

C101.1 Purpose

These Revised 255 Guidelines, which consist of 255 Chapters 1 and 2 (Appendix B), along with Chapters 3 through 7 (Appendix C), contain scoping and technical requirements for the design, development, and fabrication of telecommunications equipment and customer premises equipment, content, and support documentation and services, to ensure accessibility and usability by individuals with disabilities. These Revised 255 Guidelines are to be applied to the extent required by regulations issued by the Federal Communications Commission under Section 255 of the Communications Act of 1934, as amended (47 U.S.C. 255).

C101.2 Equivalent Facilitation

The use of an alternative design or technology that results in substantially equivalent or greater accessibility and usability by individuals with disabilities than would be provided by conformance to one or more of the requirements in Chapters 4 and 5 of the Revised 255 Guidelines is permitted. The functional performance criteria in Chapter 3 shall be used to determine whether substantially equivalent or greater accessibility and usability is provided to individuals with disabilities.

C101.3 Conventional Industry Tolerances

Dimensions are subject to conventional industry tolerances except where dimensions are stated as a range with specific minimum or maximum end points.

C101.4 Units of Measurement

Measurements are stated in metric and U.S. customary units. The values stated in each system (metric and U.S. customary units) may not be exact equivalents, and each system shall be used independently of the other.

C102 Referenced Standards

C102.1 Application

The specific editions of the standards listed in Chapter 7 are incorporated by reference into 255 Chapter 2 (Scoping Requirements) and Chapters 3 through 6 to the prescribed extent of each such reference. Where conflicts occur between the Revised 255 Guidelines and the referenced standards, these Revised 255 Guidelines apply.

C103 Definitions

C103.1 Terms Defined in Referenced Standards

Terms defined in referenced standards and not defined in C103.4 shall have the meaning as defined in the referenced standards.

C103.2 Undefined Terms

Any term not defined in C103.4 or in referenced standards shall be given its ordinarily accepted meaning in the sense that the context implies.

C103.3 Interchangeability

Words, terms, and phrases used in the singular include the plural and those used in the plural include the singular.

C103.4 Defined Terms

For the purpose of the Revised 255 Guidelines, the terms defined in C103.4 have the indicated meaning.

Application
: Software designed to perform, or to help the user perform, a specific task or tasks.

Assistive Technology (AT)
: Any item, piece of equipment, or product system, whether acquired commercially, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Audio Description
: Narration added to the soundtrack to describe important visual details that cannot be understood from the main soundtrack alone. Audio description is a means to inform individuals who are blind or who have low vision about visual content essential for comprehension. Audio description of video provides information about actions, characters, scene changes, on-screen text, and other visual content. Audio description supplements the regular audio track of a program. Audio description is usually added during existing pauses in dialogue. Audio description is also called “video description” and “descriptive narration.”

Authoring Tool
: Any software, or collection of software components, that can be used by authors, alone or collaboratively, to create or modify content for use by others, including other authors.

Closed Functionality
: Characteristics that limit functionality or prevent a user from attaching or installing assistive technology.

Content
: Electronic information and data, as well as the encoding that defines its structure, presentation, and interactions.

Customer Premises Equipment (CPE)
: Equipment used on the premises of a person (other than a carrier) to originate, route, or terminate telecommunications service or interconnected VoIP service, including software integral to the operation of telecommunications function of such equipment. Examples of CPE are telephones, routers, switches, residential gateways, set-top boxes, fixed mobile convergence products, home networking adaptors and Internet access gateways which enable consumers to access communications service providers’ services and distribute them around their house via a Local Access Network (LAN).

Document

Logically distinct assembly of content (such as a file, set of files, or streamed media) that: functions as a single entity rather than a collection; is not part of software; and does not include its own software to retrieve and present content for users. Examples of documents include, but are not limited to, letters, email messages, spreadsheets, presentations, podcasts, images, and movies.

Hardware

A tangible device, equipment, or physical component of ICT, such as telephones, computers, multifunction copy machines, and keyboards.

Information and Communication Technology (ICT)

Information technology and other equipment, systems, technologies, or processes, for which the principal function is the creation, manipulation, storage, display, receipt, or transmission of electronic data and information, as well as any associated content.

Keyboard

A set of systematically arranged alphanumeric keys or a control that generates alphanumeric input by which a machine or device is operated. A keyboard includes tactilely discernible keys used in conjunction with the alphanumeric keys if their function maps to keys on the keyboard interfaces.

Label

Text, or a component with a text alternative, that is presented to a user to identify content. A label is presented to all users, whereas a name may be hidden and only exposed by assistive technology. In many cases, the name and the label are the same.

Manufacturer

A final assembler of telecommunications equipment or customer premises equipment that sells such equipment to the public or to vendors that sell to the public.

Menu

A set of selectable options.

Name

Text by which software can identify a component to the user. A name may be hidden and only exposed by assistive technology, whereas a label is presented to all users. In many cases, the label and the name are the same. Name is unrelated to the name attribute in HTML.

Non-Web Document

A document that is not: a Web page, embedded in a Web page, or used in the rendering or functioning of Web pages.

Non-Web Software

Software that is not: a Web page, not embedded in a Web page, and not used in the rendering or functioning of Web pages.

Operable Part

Hardware-based user controls for activating, deactivating, or adjusting ICT.

Platform Accessibility Services

Services provided by a platform enabling interoperability with assistive technology. Examples are Application Programming Interfaces (API) and the Document Object Model (DOM).

Platform Software

Software that interacts with hardware or provides services for other software. Platform software may run or host other software, and may isolate them from underlying software or hardware layers. A single software component may have both platform and non-platform aspects. Examples of platforms are: desktop operating systems; embedded operating systems, including mobile systems; Web browsers; plug-ins to Web browsers that render a particular media or format; and sets of components that allow other applications to execute, such as applications which support macros or scripting.

Programmatically Determinable

Ability to be determined by software from author-supplied data that is provided in a way that different user agents, including assistive technologies, can extract and present the information to users in different modalities.

Real-Time Text (RTT)

Communications using the transmission of text by which characters are transmitted by a terminal as they are typed. Real-time text is used for conversational purposes. Real-time text also may be used in voicemail, interactive voice response systems, and other similar application.

Revised 255 Guidelines

The guidelines for telecommunications equipment and customer premises equipment covered by Section 255 of the Communications Act as set forth in 255 Chapters 1 and 2 (36 CFR part 1194, Appendix B), and Chapters 3 through 7 (36 CFR part 1193, Appendix C).

Software

Programs, procedures, rules, and related data and documentation that direct the use and operation of ICT and instruct it to perform a given task or function. Software includes, but is not limited to, applications, non-Web software, and platform software.

Software Tools

Software for which the primary function is the development of other software. Software tools usually come in the form of an Integrated Development Environment (IDE) and are a suite of related products and utilities. Examples of IDEs include Microsoft® Visual Studio®, Apple® Xcode®, and Eclipse Foundation Eclipse®

Specialized Customer Premises Equipment

Assistive technology used by individuals with disabilities to originate, route, or terminate telecommunications or interconnected VoIP service. Examples are TTYs and amplified telephones.

Telecommunications

The signal transmission between or among points specified by the user of information and of the user's choosing without change in the form or content of the information as sent and received.

Telecommunications Equipment

Equipment, other than customer premises equipment, used by a carrier to provide telecommunications service or interconnected VoIP service and includes software integral to the operation of telecommunications function of such equipment.

Terminal

Device or software with which the end user directly interacts and that provides the user interface. For some systems, the software that provides the user interface may reside on more than one device such as a telephone and a server.

Text

A sequence of characters that can be programmatically determined and that expresses something in human language.

TTY

Equipment that enables interactive text based communications through the transmission of frequency-shift-keying audio tones across the public switched telephone network. TTYs include devices for real-time text communications and voice and text intermixed communications. Examples of intermixed communications are voice carry over and hearing carry over. One example of a TTY is a computer with TTY emulating software and modem.

Variable Message Signs (VMS)

Non-interactive electronic signs with scrolling, streaming, or paging-down capability. An example of a VMS is an electronic message board at a transit station that displays the gate and time information associated with the next train arrival.

Voice over Internet Protocol (VoIP)

A technology that provides real-time voice communications. VoIP requires a broadband connection from the user's location and customer premises equipment compatible with Internet protocol.

Web page

A non-embedded resource obtained from a single Universal Resource Identifier (URI) using HyperText Transfer Protocol (HTTP) plus any other resources that are provided for the rendering, retrieval, and presentation of content.

255 Chapter 2: Scoping Requirements

C201 Application

C201.1 Scope

Manufacturers shall comply with the requirements in the Revised 255 Guidelines applicable to telecommunications equipment and customer premises equipment (and related software integral to the operation of telecommunications functions) when newly released, upgraded, or substantially changed from an earlier version or model. Manufacturers shall also conform to the requirements in the Revised 255 Guidelines for support documentation and services, including electronic documents and Web-based product support.

C201.2. Readily Achievable

When a manufacturer determines that conformance to one or more requirements in Chapter 4 (Hardware) or Chapter 5 (Software) would not be readily achievable, it shall ensure that the equipment or software is compatible with existing peripheral devices or specialized customer premises equipment commonly used by individuals with disabilities to the extent readily achievable.

C201.3 Access to Functionality

Manufacturers shall ensure that telecommunications equipment and customer premises equipment is accessible to and usable by individuals with disabilities by providing direct access to all telecommunications functionality. Where manufacturers can demonstrate that it is not readily achievable for such equipment to provide direct access to all functionality, the equipment shall support the use of assistive technology and specialized customer premises equipment where readily achievable.

C201.4 Prohibited Reduction of Accessibility, Usability, and Compatibility

No change shall be undertaken that decreases, or has the effect of decreasing, the net accessibility, usability, or compatibility of telecommunications equipment or customer premises equipment.

EXCEPTION: Discontinuation of a product shall not be prohibited.

C201.5 Design, Development, and Fabrication

Manufacturers shall evaluate the accessibility, usability, and interoperability of telecommunications equipment and customer premises equipment during its product design, development, and fabrication.

C202 Functional Performance Criteria

C202.1 General

Where the requirements in Chapters 4 and 5 do not address one or more functions of telecommunications or customer premises equipment, the functions not addressed shall conform to the Functional Performance Criteria specified in Chapter 3.

C203 Electronic Content

C203.1 General

Electronic content that is integral to the use of telecommunications or customer premises equipment shall conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1).
EXCEPTION: Non-Web documents shall not be required to conform to the following four WCAG 2.0 Success Criteria: 2.4.1 Bypass Blocks, 2.4.5 Multiple Ways, 3.2.3 Consistent Navigation, and 3.2.4 Consistent Identification.

C203.1.1 Word Substitution when Applying WCAG to Non-Web Documents

For non-Web documents, wherever the term “Web page” or “page” appears in WCAG 2.0 Level A and AA Success Criteria and Conformance Requirements, the term “document’ shall be substituted for the terms “Web page” and “page.” In addition, in Success Criterion in 1.4.2, the phrase “in a document” shall be substituted for the phrase “on a Web page.”

C204 Hardware

C204.1 General

Where components of telecommunications equipment and customer premises equipment are hardware, and transmit information or have a user interface, those components shall conform to applicable requirements in Chapter 4.
EXCEPTION: Components of telecommunications equipment and customer premises equipment shall not be required to conform to 402, 407.7, 407.8, 408, 412.8.4, and 415.

C205 Software

C205.1 General

Where software is integral to the use of telecommunications functions of telecommunications equipment or customer premises equipment and has a user interface, such software shall conform to C205 and applicable requirements in Chapter 5.
EXCEPTION: Software that is assistive technology and that supports the accessibility services of the platform shall not be required to conform to the requirements in Chapter 5.

C205.2 WCAG Conformance

User interface components, as well as the content of platforms and applications shall conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1).
EXCEPTIONS:

1. Software that is assistive technology and that supports the accessibility services of the platform shall not be required to conform to C205.2.
2. Non-Web software shall not be required to conform to the following four Success Criteria in WCAG 2.0: 2.4.1 Bypass Blocks; 2.4.5 Multiple Ways; 3.2.3 Consistent Navigation; and 3.2.4 Consistent Identification.

3. Non-Web software shall not be required to conform to Conformance Requirement 3 Complete Processes in WCAG 2.0.

C205.2.1 Word Substitution when Applying WCAG to Non-Web Software

For non-Web software, wherever the term “Web page” or “page” appears in WCAG 2.0 Level A and AA Success Criteria and Conformance Requirements, the term “software” shall be substituted for the terms “Web page” and “page.” In addition, in Success Criterion 1.4.2, the phrase “in software” shall be substituted for the phrase “on a Web page.”

C205.3 Complete Processes for Non-Web Software

Where non-Web software requires multiple steps to accomplish an activity, all software related to the activity to be accomplished shall conform to WCAG 2.0 as specified in C205.2.

C206 Support Documentation and Services

C206.1 General

Where support documentation and services are provided for telecommunications equipment and customer premises equipment, manufacturers shall ensure that such documentation and services conform to Chapter 6 and are made available upon request at no additional charge.

Appendix C to Part 1194 – Functional Performance Criteria and Technical Requirements

Chapter 3: Functional Performance Criteria

301 General

301.1 Scope

The requirements of Chapter 3 shall apply to ICT where required by 508 Chapter 2 (Scoping Requirements), 255 Chapter 2 (Scoping Requirements), and where otherwise referenced in any other chapter of the Revised 508 Standards or Revised 255 Guidelines.

302 Functional Performance Criteria

302.1 Without Vision

Where a visual mode of operation is provided, ICT shall provide at least one mode of operation that does not require user vision.

302.2 With Limited Vision

Where a visual mode of operation is provided, ICT shall provide at least one mode of operation that enables users to make use of limited vision.

302.3 Without Perception of Color

Where a visual mode of operation is provided, ICT shall provide at least one visual mode of operation that does not require user perception of color.

302.4 Without Hearing

Where an audible mode of operation is provided, ICT shall provide at least one mode of operation that does not require user hearing.

302.5 With Limited Hearing

Where an audible mode of operation is provided, ICT shall provide at least one mode of operation that enables users to make use of limited hearing.

302.6 Without Speech

Where speech is used for input, control, or operation, ICT shall provide at least one mode of operation that does not require user speech.

302.7 With Limited Manipulation

Where a manual mode of operation is provided, ICT shall provide at least one mode of operation that does not require fine motor control or simultaneous manual operations.

302.8 With Limited Reach and Strength

Where a manual mode of operation is provided, ICT shall provide at least one mode of operation that is operable with limited reach and limited strength.

302.9 With Limited Language, Cognitive, and Learning Abilities

ICT shall provide features making its use by individuals with limited cognitive, language, and learning abilities simpler and easier.

Chapter 4: Hardware

401 General

401.1 Scope

The requirements of Chapter 4 shall apply to ICT that is hardware where required by 508 Chapter 2 (Scoping Requirements), 255 Chapter 2 (Scoping Requirements), and where otherwise referenced in any other chapter of the Revised 508 Standards or Revised 255 Guidelines.
EXCEPTION: Hardware that is assistive technology shall not be required to conform to the requirements of this chapter.

402 Closed Functionality

402.1 General

ICT with closed functionality shall be operable without requiring the user to attach or install assistive technology other than personal headsets or other audio couplers, and shall conform to 402.

402.2 Speech-Output Enabled

ICT with a display screen shall be speech-output enabled for full and independent use by individuals with vision impairments.
EXCEPTIONS:

1. Variable message signs conforming to 402.5 shall not be required to be speech-output enabled.
2. Speech output shall not be required where ICT display screens only provide status indicators and those indicators conform to 409.
3. Where speech output cannot be supported due to constraints in available memory or processor capability, ICT shall be permitted to conform to 409 in lieu of 402.2.
4. Audible tones shall be permitted instead of speech output where the content of user input is not displayed as entered for security purposes, including, but not limited to, asterisks representing personal identification numbers.
5. Speech output shall not be required for: the machine location; date and time of transaction; customer account number; and the machine identifier or label.
6. Speech output shall not be required for advertisements and other similar information unless they convey information that can be used for the transaction being conducted.

402.2.1 Information Displayed On-Screen

Speech output shall be provided for all information displayed on-screen.

402.2.2 Transactional Outputs

Where transactional outputs are provided, the speech output shall audibly provide all information necessary to verify a transaction.

402.2.3 Speech Delivery Type and Coordination

Speech output shall be delivered through a mechanism that is readily available to all users, including, but not limited to, an industry standard connector or a telephone handset. Speech shall be recorded or digitized human, or synthesized. Speech output shall be coordinated with information displayed on the screen.

402.2.4 User Control

Speech output for any single function shall be automatically interrupted when a transaction is selected. Speech output shall be capable of being repeated and paused.

402.2.5 Braille Instructions

Where speech output is required by 402.2, braille instructions for initiating the speech mode of operation shall be provided. Braille shall be contracted and shall conform to 36 CFR part 1191, Appendix D, Section 703.3.1.
EXCEPTION: Devices for personal use shall not be required to conform to 402.2.5.

402.3 Volume

ICT that delivers sound, including speech output required by 402.2, shall provide volume control and output amplification conforming to 402.3.
EXCEPTION: ICT conforming to 412.2 shall not be required to conform to 402.3.

402.3.1 Private Listening

Where ICT provides private listening, it shall provide a mode of operation for controlling the volume. Where ICT delivers output by an audio transducer typically held up to the ear, a means for effective magnetic wireless coupling to hearing technologies shall be provided.

402.3.2 Non-private Listening

Where ICT provides non-private listening, incremental volume control shall be provided with output amplification up to a level of at least 65 dB. A function shall be provided to automatically reset the volume to the default level after every use.

402.4 Characters on Display Screens

At least one mode of characters displayed on the screen shall be in a sans serif font. Where ICT does not provide a screen enlargement feature, characters shall be 3/16 inch (4.8 mm) high minimum based on the uppercase letter “I”. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.

402.5 Characters on Variable Message Signs

Characters on variable message signs shall conform to section 703.7 Variable Message Signs of ICC A117.1-2009 (incorporated by reference, see 702.6.1).

403 Biometrics

403.1 General

Where provided, biometrics shall not be the only means for user identification or control.
EXCEPTION: Where at least two biometric options that use different biological characteristics are provided, ICT shall be permitted to use biometrics as the only means for user identification or control.

404 Preservation of Information Provided for Accessibility

404.1 General

ICT that transmits or converts information or communication shall not remove non-proprietary information provided for accessibility or shall restore it upon delivery.

405 Privacy

405.1 General

The same degree of privacy of input and output shall be provided to all individuals. When speech output required by 402.2 is enabled, the screen shall not blank automatically.

406 Standard Connections

406.1 General

Where data connections used for input and output are provided, at least one of each type of connection shall conform to industry standard non-proprietary formats.

407 Operable Parts

407.1 General

Where provided, operable parts used in the normal operation of ICT shall conform to 407.

407.2 Contrast

Where provided, keys and controls shall contrast visually from background surfaces. Characters and symbols shall contrast visually from background surfaces with either light characters or symbols on a dark background or dark characters or symbols on a light background.

407.3 Input Controls

At least one input control conforming to 407.3 shall be provided for each function.
EXCEPTION: Devices for personal use with input controls that are audibly discernable without activation and operable by touch shall not be required to conform to 407.3.

407.3.1 Tactilely Discernible

Input controls shall be operable by touch and tactilely discernible without activation.

407.3.2 Alphabetic Keys

Where provided, individual alphabetic keys shall be arranged in a QWERTY-based keyboard layout and the “F” and “J” keys shall be tactilely distinct from the other keys.

407.3.3 Numeric Keys

Where provided, numeric keys shall be arranged in a 12-key ascending or descending keypad layout. The number five key shall be tactilely distinct from the other keys. Where the ICT provides an alphabetic overlay on numeric keys, the relationships between letters and digits shall conform to ITU-T Recommendation E.161 (incorporated by reference, see 702.7.1).

407.4 Key Repeat

Where a keyboard with key repeat is provided, the delay before the key repeat feature is activated shall be fixed at, or adjustable to, 2 seconds minimum.

407.5 Timed Response

Where a timed response is required, the user shall be alerted visually, as well as by touch or sound, and shall be given the opportunity to indicate that more time is needed.

407.6 Operation

At least one mode of operation shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N) maximum.

407.7 Tickets, Fare Cards, and Keycards

Where tickets, fare cards, or keycards are provided, they shall have an orientation that is tactilely discernible if orientation is important to further use of the ticket, fare card, or keycard.

407.8 Reach Height and Depth

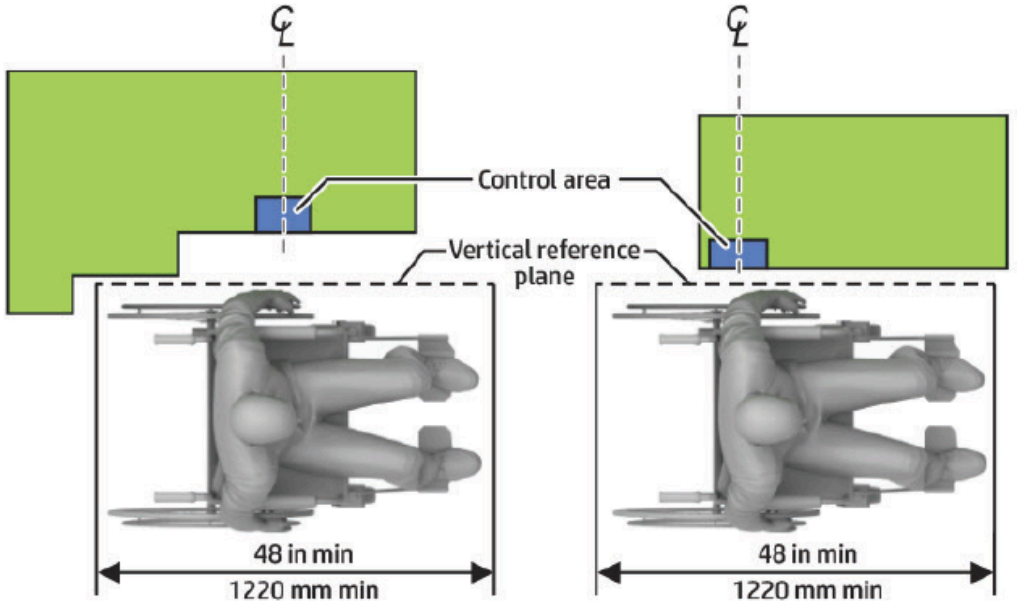
At least one of each type of operable part of stationary ICT shall be at a height conforming to 407.8.2 or 407.8.3 according to its position established by the vertical reference plane specified in 407.8.1 for a side reach or a forward reach. Operable parts used with speech output required by 402.2 shall not be the only type of operable part complying with 407.8 unless that part is the only operable part of its type.

407.8.1 Vertical Reference Plane

Operable parts shall be positioned for a side reach or a forward reach determined with respect to a vertical reference plane. The vertical reference plane shall be located in conformance to 407.8.2 or 407.8.3.

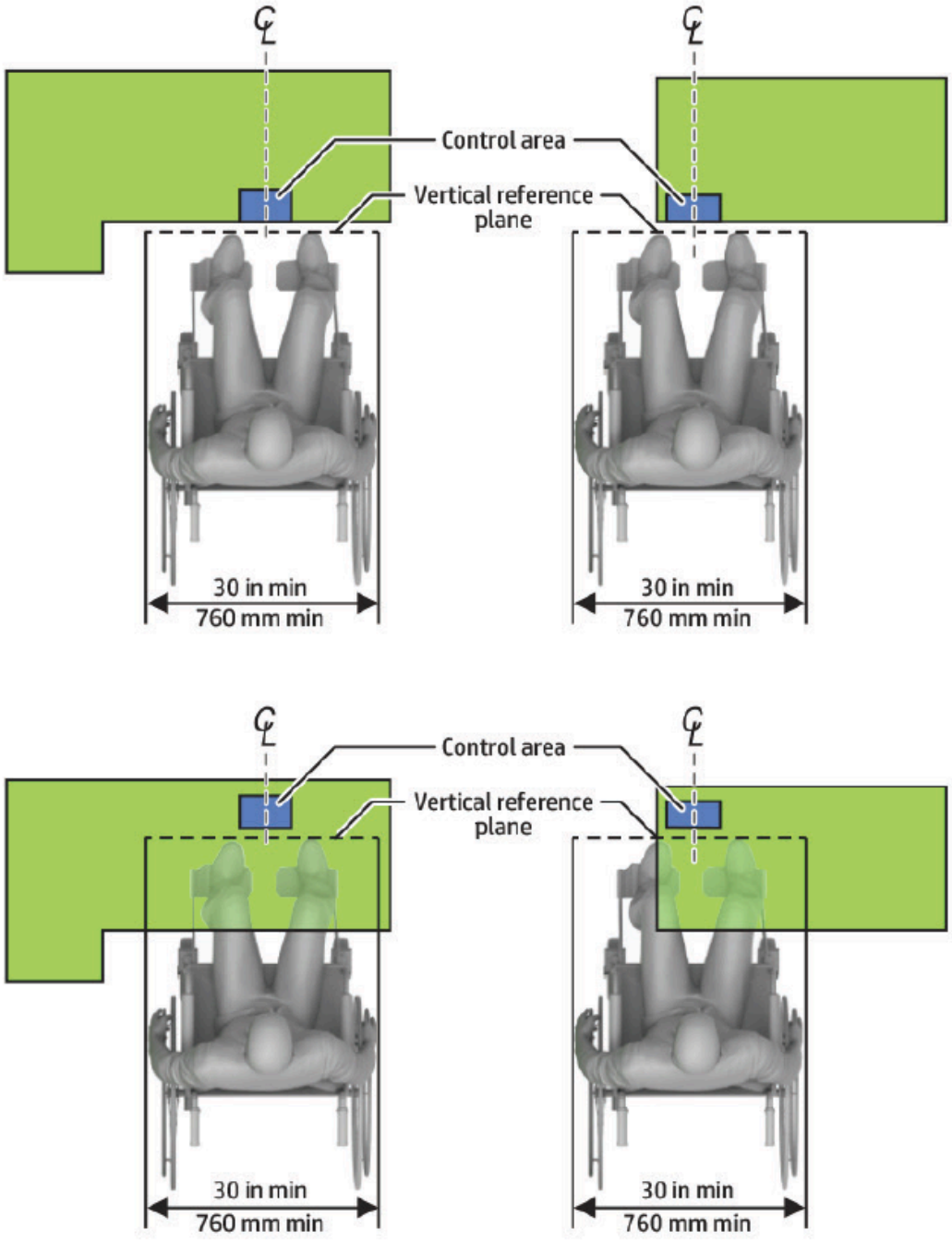
407.8.1.1 Vertical Plane for Side Reach

Where a side reach is provided, the vertical reference plane shall be 48 inches (1220 mm) long minimum.



407.8.1.2 Vertical Plane for Forward Reach

Where a forward reach is provided, the vertical reference plane shall be 30 inches (760 mm) long minimum.

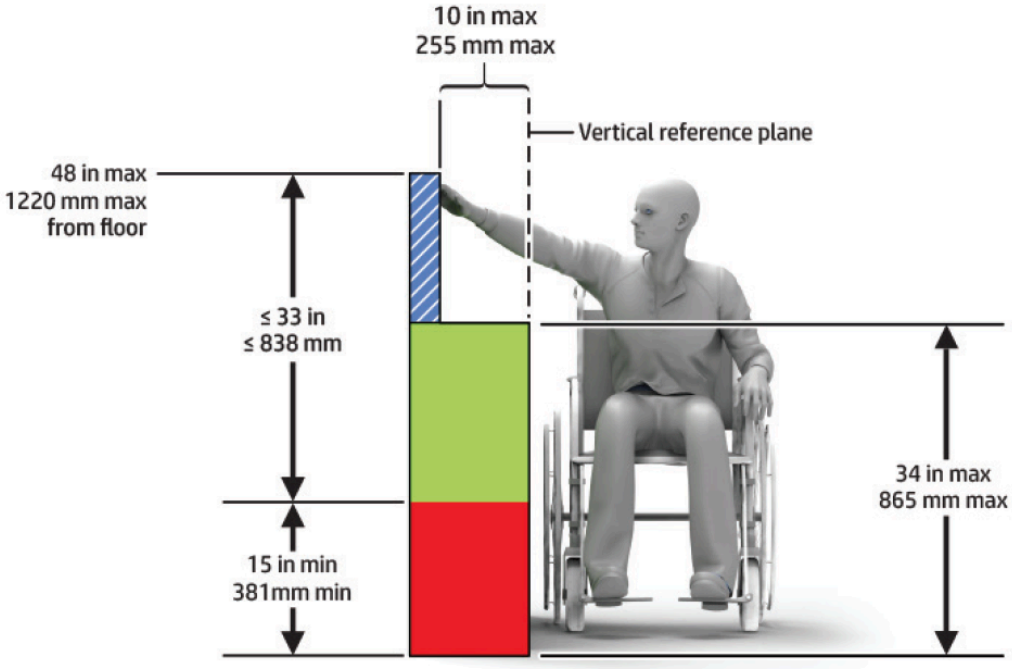


407.8.2 Side Reach

Operable parts of ICT providing a side reach shall conform to 407.8.2.1 or 407.8.2.2. The vertical reference plane shall be centered on the operable part and placed at the leading edge of the maximum protrusion of the ICT within the length of the vertical reference plane. Where a side reach requires a reach over a portion of the ICT, the height of that portion of the ICT shall be 34 inches (865 mm) maximum.

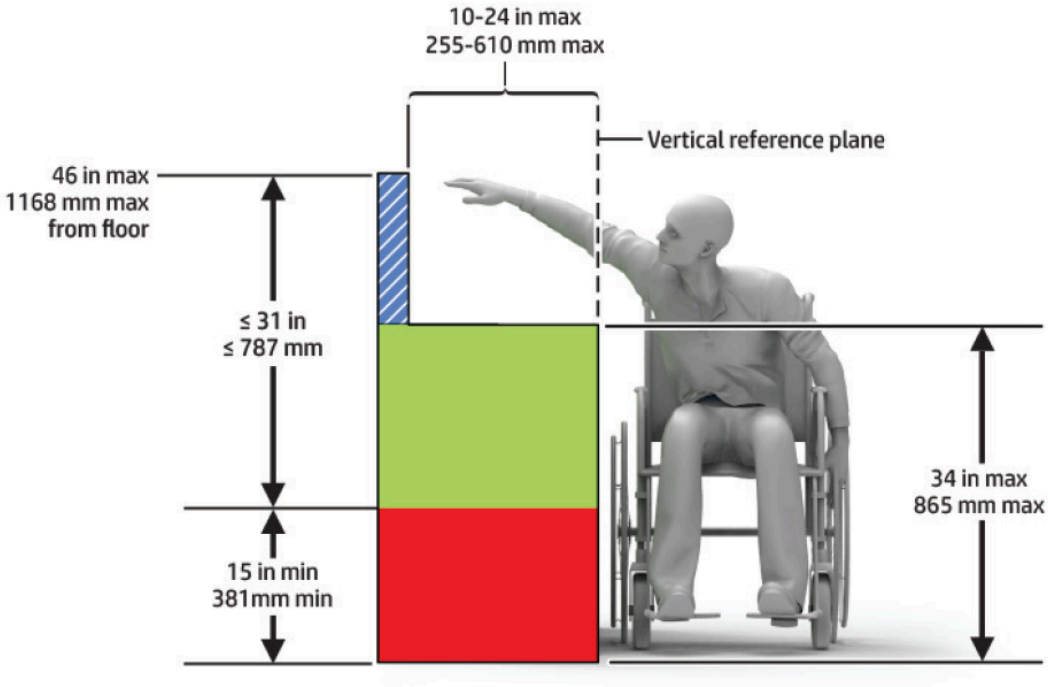
407.8.2.1 Unobstructed Side Reach

Where the operable part is located 10 inches (255 mm) or less beyond the vertical reference plane, the operable part shall be 48 inches (1220 mm) high maximum and 15 inches (380 mm) high minimum above the floor.



407.8.2.2 Obstructed Side Reach

Where the operable part is located more than 10 inches (255 mm), but not more than 24 inches (610 mm), beyond the vertical reference plane, the height of the operable part shall be 46 inches (1170 mm) high maximum and 15 inches (380 mm) high minimum above the floor. The operable part shall not be located more than 24 inches (610 mm) beyond the vertical reference plane.

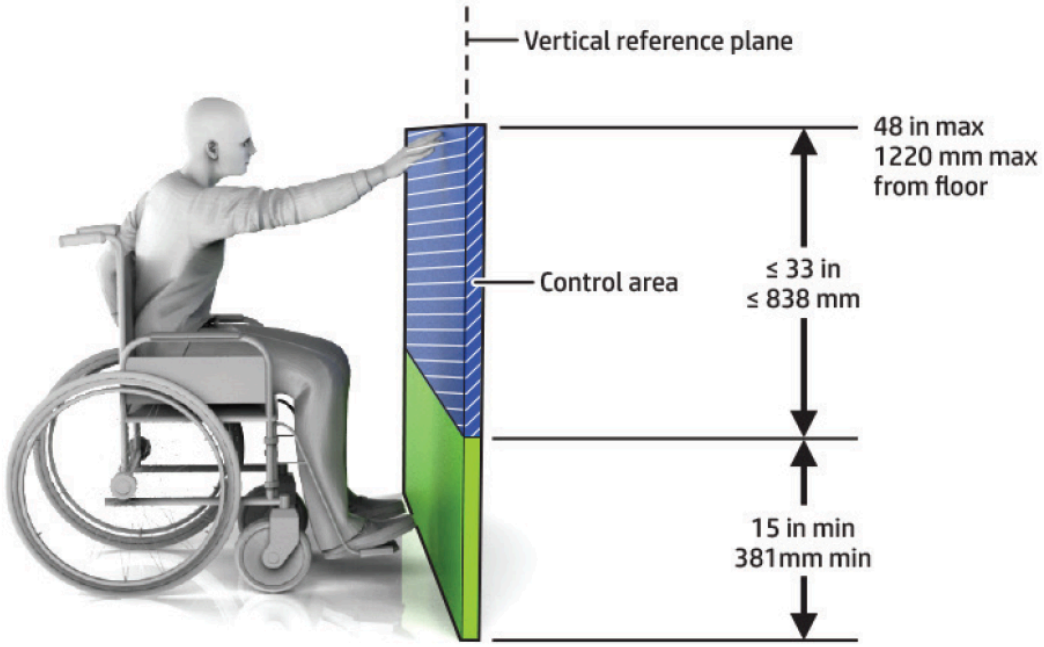


407.8.3 Forward Reach

Operable parts of ICT providing a forward reach shall conform to 407.8.3.1 or 407.8.3.2. The vertical reference plane shall be centered, and intersect with, the operable part. Where a forward reach allows a reach over a portion of the ICT, the height of that portion of the ICT shall be 34 inches (865 mm) maximum.

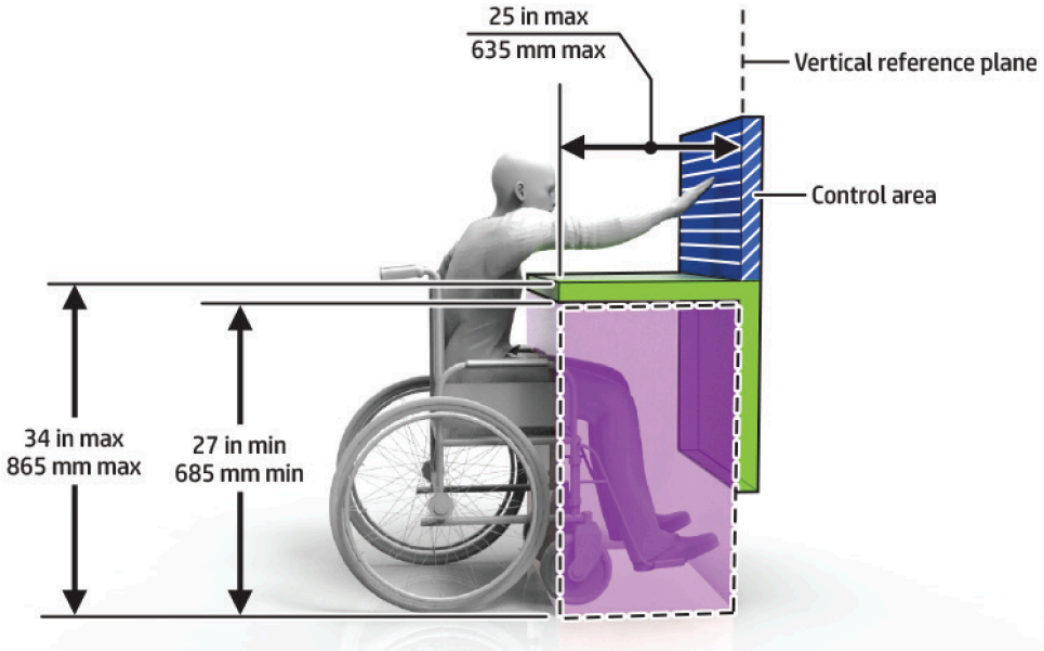
407.8.3.1 Unobstructed Forward Reach

Where the operable part is located at the leading edge of the maximum protrusion within the length of the vertical reference plane of the ICT, the operable part shall be 48 inches (1220 mm) high maximum and 15 inches (380 mm) high minimum above the floor.



407.8.3.2 Obstructed Forward Reach

Where the operable part is located beyond the leading edge of the maximum protrusion within the length of the vertical reference plane, the operable part shall conform to 407.8.3.2. The maximum allowable forward reach to an operable part shall be 25 inches (635 mm).

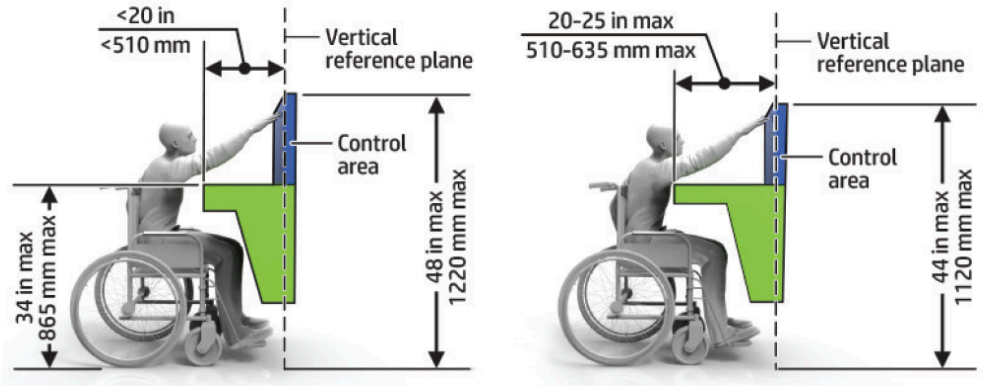


407.8.3.2.1 Operable Part Height for ICT with Obstructed Forward Reach

The height of the operable part shall conform to Table 407.8.3.2.1.

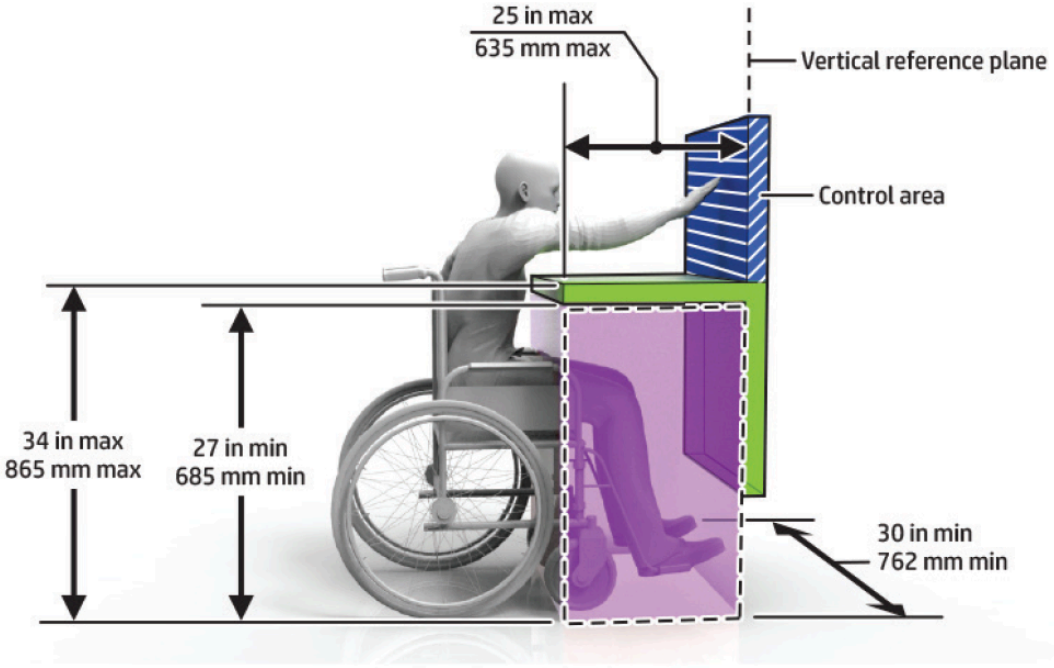
Table 407.8.3.2.1 Operable Part Height for ICT with Obstructed Forward Reach

Reach Depth	Operable Part Height
Less than 20 inches (510 mm)	48 inches (1220 mm) maximum
20 inches (510 mm) to 25 inches (635 mm)	44 inches (1120 mm) maximum



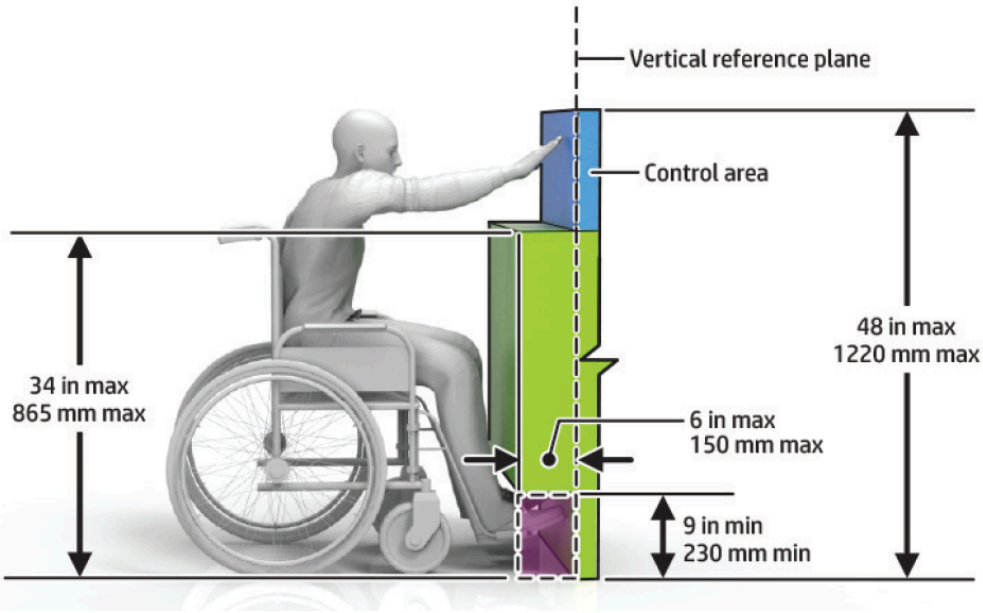
407.8.3.2.2 Knee and Toe Space under ICT with Obstructed Forward Reach

Knee and toe space under ICT shall be 27 inches (685 mm) high minimum, 25 inches (635 mm) deep maximum, and 30 inches (760 mm) wide minimum and shall be clear of obstructions.

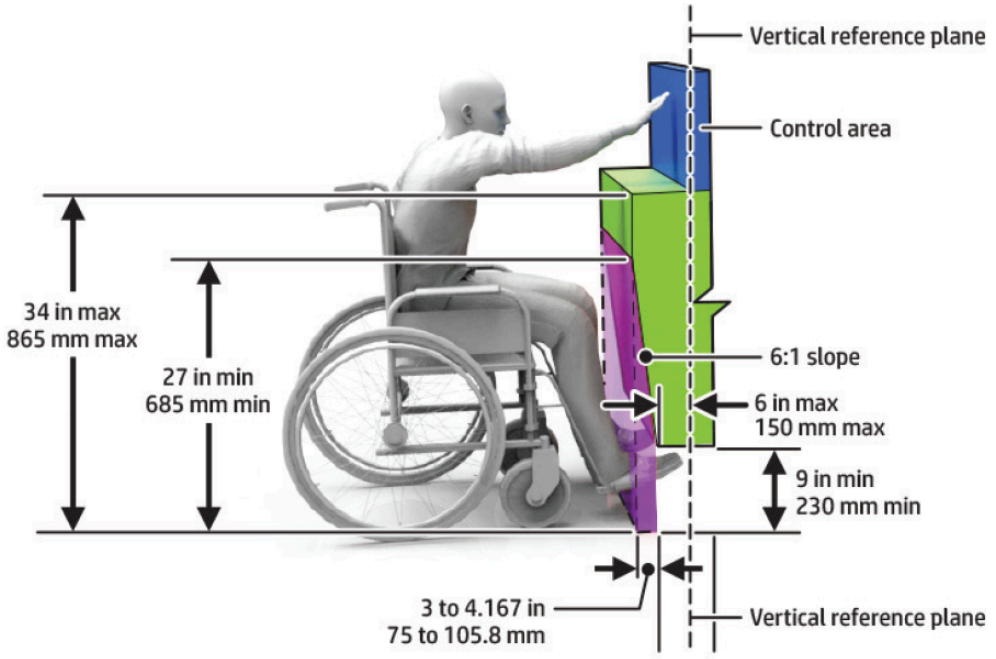


EXCEPTIONS:

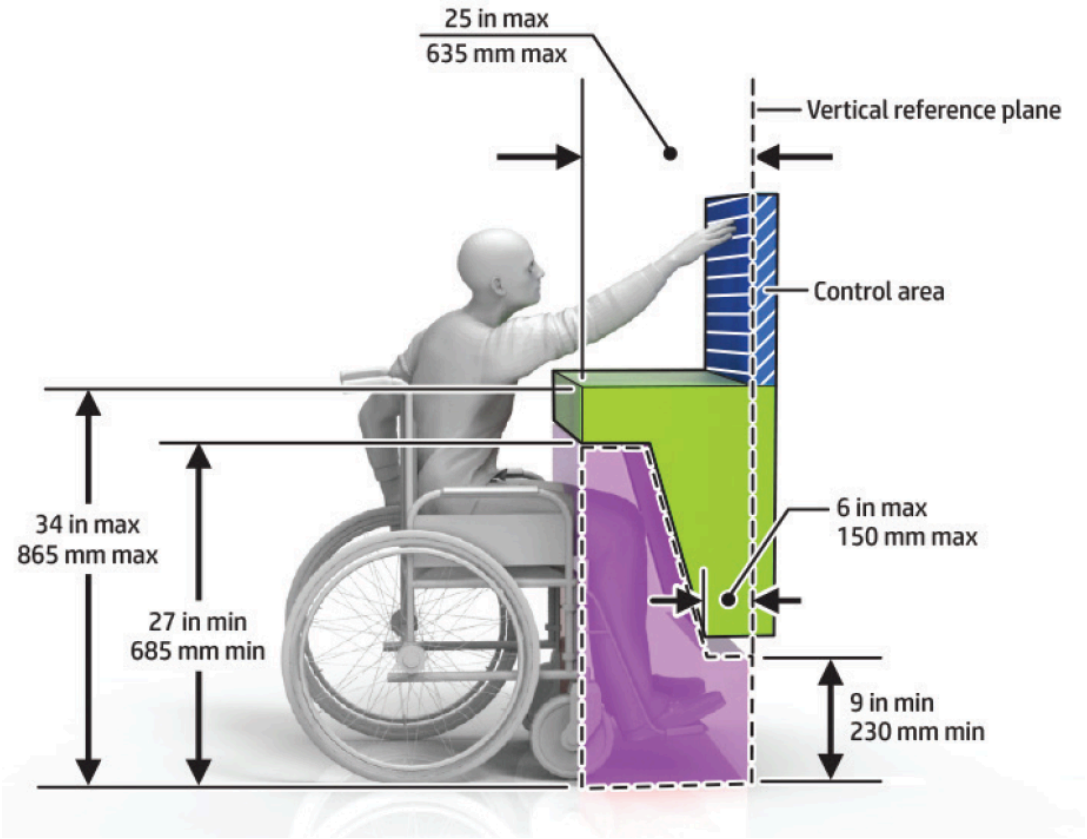
1. Toe space shall be permitted to provide a clear height of 9 inches (230 mm) minimum above the floor and a clear depth of 6 inches (150 mm) maximum from the vertical reference plane toward the leading edge of the ICT.



2. At a depth of 6 inches (150 mm) maximum from the vertical reference plane toward the leading edge of the ICT, space between 9 inches (230 mm) and 27 inches (685 mm) minimum above the floor shall be permitted to reduce at a rate of 1 inch (25 mm) in depth for every 6 inches (150 mm) in height.



Supplemental graphic combining both Exceptions 1 and 2:



408 Display Screens

408.1 General

Where provided, display screens shall conform to 408.

408.2 Visibility

Where stationary ICT provides one or more display screens, at least one of each type of display screen shall be visible from a point located 40 inches (1015 mm) above the floor space where the display screen is viewed.

408.3 Flashing

Where ICT emits lights in flashes, there shall be no more than three flashes in any one-second period.
EXCEPTION: Flashes that do not exceed the general flash and red flash thresholds defined in WCAG 2.0 (incorporated by reference, see 702.10.1) are not required to conform to 408.3.

409 Status Indicators

409.1 General

Where provided, status indicators shall be discernible visually and by touch or sound.

410 Color Coding

410.1 General

Where provided, color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

411 Audible Signals

411.1 General

Where provided, audible signals or cues shall not be used as the only means of conveying information, indicating an action, or prompting a response

412 ICT with Two-Way Voice Communication

412.1 General

ICT that provides two-way voice communication shall conform to 412.

412.2 Volume Gain

ICT that provides two-way voice communication shall conform to 412.2.1 or 412.2.2.

412.2.1 Volume Gain for Wireline Telephones

Volume gain conforming to 47 CFR 68.317 shall be provided on analog and digital wireline telephones.

412.2.2 Volume Gain for Non-Wireline ICT

A method for increasing volume shall be provided for non-wireline ICT.

412.3 Interference Reduction and Magnetic Coupling

Where ICT delivers output by a handset or other type of audio transducer that is typically held up to the ear, ICT shall reduce interference with hearing technologies and provide a means for effective magnetic wireless coupling in conformance with 412.3.1 or 412.3.2.

412.3.1 Wireless Handsets

ICT in the form of wireless handsets shall conform to ANSI/IEEE C63.19-2011 (incorporated by reference, see 702.5.1).

412.3.2 Wireline Handsets

ICT in the form of wireline handsets, including cordless handsets, shall conform to TIA-1083-B (incorporated by reference, see702.9.1).

412.4 Digital Encoding of Speech

ICT in IP-based networks shall transmit and receive speech that is digitally encoded in the manner specified by ITU-T Recommendation G.722.2 (incorporated by reference, see 702.7.2) or IETF RFC 6716 (incorporated by reference, see 702.8.1).

412.5 Real-Time Text Functionality

[Reserved].

412.6 Caller ID

Where provided, caller identification and similar telecommunications functions shall be visible and audible.

412.7 Video Communication

Where ICT provides real-time video functionality, the quality of the video shall be sufficient to support communication using sign language.

412.8 Legacy TTY Support

ICT equipment or systems with two-way voice communication that do not themselves provide TTY functionality shall conform to 412.8.

412.8.1 TTY Connectability

ICT shall include a standard non-acoustic connection point for TTYs.

412.8.2 Voice and Hearing Carry Over

ICT shall provide a microphone capable of being turned on and off to allow the user to intermix speech with TTY use.

412.8.3 Signal Compatibility

ICT shall support all commonly used cross-manufacturer non-proprietary standard TTY signal protocols where the system interoperates with the Public Switched Telephone Network (PSTN).

412.8.4 Voice Mail and Other Messaging Systems

Where provided, voice mail, auto-attendant, interactive voice response, and caller identification systems shall be usable with a TTY.

413 Closed Caption Processing Technologies

413.1 General

Where ICT displays or processes video with synchronized audio, ICT shall provide closed caption processing technology that conforms to 413.1.1 or 413.1.2.

413.1.1 Decoding and Display of Closed Captions

Players and displays shall decode closed caption data and support display of captions.

413.1.2 Pass-Through of Closed Caption Data

Cabling and ancillary equipment shall pass through caption data.

414 Audio Description Processing Technologies

414.1 General

Where ICT displays or processes video with synchronized audio, ICT shall provide audio description processing technology conforming to 414.1.1 or 414.1.2.

414.1.1 Digital Television Tuners

Digital television tuners shall provide audio description processing that conforms to ATSC A/53 Digital Television Standard, Part 5 (2014) (incorporated by reference, see 702.2.1). Digital television tuners shall provide processing of audio description when encoded as a Visually Impaired (VI) associated audio service that is provided as a complete program mix containing audio description according to the ATSC A/53 standard.

414.1.2 Other ICT

ICT other than digital television tuners shall provide audio description processing.

415 User Controls for Captions and Audio Descriptions

415.1 General

Where ICT displays video with synchronized audio, ICT shall provide user controls for closed captions and audio descriptions conforming to 415.1.
EXCEPTION: Devices for personal use shall not be required to conform to 415.1 provided that captions and audio descriptions can be enabled through system-wide platform settings.

415.1.1 Caption Controls

Where ICT provides operable parts for volume control, ICT shall also provide operable parts for caption selection.

415.1.2 Audio Description Controls

Where ICT provides operable parts for program selection, ICT shall also provide operable parts for the selection of audio description.

Chapter 5: Software

501 General

501.1 Scope

The requirements of Chapter 5 shall apply to software where required by 508 Chapter 2 (Scoping Requirements), 255 Chapter 2 (Scoping Requirements), and where otherwise referenced in any other chapter of the Revised 508 Standards or Revised 255 Guidelines.
EXCEPTION: Where Web applications do not have access to platform accessibility services and do not include components that have access to platform accessibility services, they shall not be required to conform to 502 or 503 provided that they conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1).

502 Interoperability with Assistive Technology

502.1 General

Software shall interoperate with assistive technology and shall conform to 502.
EXCEPTION: ICT conforming to 402 shall not be required to conform to 502.

502.2 Documented Accessibility Features

Software with platform features defined in platform documentation as accessibility features shall conform to 502.2.

502.2.1 User Control of Accessibility Features

Platform software shall provide user control over platform features that are defined in the platform documentation as accessibility features.

502.2.2 No Disruption of Accessibility Features

Software shall not disrupt platform features that are defined in the platform documentation as accessibility features.

502.3 Accessibility Services

Platform software and software tools that are provided by the platform developer shall provide a documented set of accessibility services that support applications running on the platform to interoperate with assistive technology and shall conform to 502.3. Applications that are also platforms shall expose the underlying platform accessibility services or implement other documented accessibility services.

502.3.1 Object Information

The object role, state(s), properties, boundary, name, and description shall be programmatically determinable.

502.3.2 Modification of Object Information

States and properties that can be set by the user shall be capable of being set programmatically, including through assistive technology.

502.3.3 Row, Column, and Headers

If an object is in a data table, the occupied rows and columns, and any headers associated with those rows or columns, shall be programmatically determinable.

502.3.4 Values

Any current value(s), and any set or range of allowable values associated with an object, shall be programmatically determinable.

502.3.5 Modification of Values

Values that can be set by the user shall be capable of being set programmatically, including through assistive technology.

502.3.6 Label Relationships

Any relationship that a component has as a label for another component, or of being labeled by another component, shall be programmatically determinable.

502.3.7 Hierarchical Relationships

Any hierarchical (parent-child) relationship that a component has as a container for, or being contained by, another component shall be programmatically determinable.

502.3.8 Text

The content of text objects, text attributes, and the boundary of text rendered to the screen, shall be programmatically determinable.

502.3.9 Modification of Text

Text that can be set by the user shall be capable of being set programmatically, including through assistive technology.

502.3.10 List of Actions

A list of all actions that can be executed on an object shall be programmatically determinable.

502.3.11 Actions on Objects

Applications shall allow assistive technology to programmatically execute available actions on objects.

502.3.12 Focus Cursor

Applications shall expose information and mechanisms necessary to track focus, text insertion point, and selection attributes of user interface components.

502.3.13 Modification of Focus Cursor

Focus, text insertion point, and selection attributes that can be set by the user shall be capable of being set programmatically, including through the use of assistive technology.

502.3.14 Event Notification

Notification of events relevant to user interactions, including but not limited to, changes in the component's state(s), value, name, description, or boundary, shall be available to assistive technology.

502.4 Platform Accessibility Features

Platforms and platform software shall conform to the requirements in ANSI/HFES 200.2, Human Factors Engineering of Software User Interfaces — Part 2: Accessibility (2008) (incorporated by reference, see 702.4.1) listed below:

1. Section 9.3.3 Enable sequential entry of multiple (chorded) keystrokes;
2. Section 9.3.4 Provide adjustment of delay before key acceptance;
3. Section 9.3.5 Provide adjustment of same-key double-strike acceptance;
4. Section 10.6.7 Allow users to choose visual alternative for audio output;
5. Section 10.6.8 Synchronize audio equivalents for visual events;
6. Section 10.6.9 Provide speech output services; and
7. Section 10.7.1 Display any captions provided.

503 Applications

503.1 General

Applications shall conform to 503.

503.2 User Preferences

Applications shall permit user preferences from platform settings for color, contrast, font type, font size, and focus cursor.
EXCEPTION: Applications that are designed to be isolated from their underlying platform software, including Web applications, shall not be required to conform to 503.2.

503.3 Alternative User Interfaces

Where an application provides an alternative user interface that functions as assistive technology, the application shall use platform and other industry standard accessibility services.

503.4 User Controls for Captions and Audio Description

Where ICT displays video with synchronized audio, ICT shall provide user controls for closed captions and audio descriptions conforming to 503.4.

503.4.1 Caption Controls

Where user controls are provided for volume adjustment, ICT shall provide user controls for the selection of captions at the same menu level as the user controls for volume or program selection.

503.4.2 Audio Description Controls

Where user controls are provided for program selection, ICT shall provide user controls for the selection of audio descriptions at the same menu level as the user controls for volume or program selection.

504 Authoring Tools

504.1 General

Where an application is an authoring tool, the application shall conform to 504 to the extent that information required for accessibility is supported by the destination format.

504.2 Content Creation or Editing

Authoring tools shall provide a mode of operation to create or edit content that conforms to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1) for all supported features and, as applicable, to file formats supported by the authoring tool. Authoring tools shall permit authors the option of overriding information required for accessibility.
EXCEPTION: Authoring tools shall not be required to conform to 504.2 when used to directly edit plain text source code.

504.2.1 Preservation of Information Provided for Accessibility in Format Conversion

Authoring tools shall, when converting content from one format to another or saving content in multiple formats, preserve the information required for accessibility to the extent that the information is supported by the destination format.

504.2.2 PDF Export

Authoring tools capable of exporting PDF files that conform to ISO 32000-1:2008 (PDF 1.7) shall also be capable of exporting PDF files that conform to ANSI/AIIM/ISO 14289-1:2016 (PDF/UA-1) (incorporated by reference, see 702.3.1).

504.3 Prompts

Authoring tools shall provide a mode of operation that prompts authors to create content that conforms to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1) for supported features and, as applicable, to file formats supported by the authoring tool.

504.4 Templates

Where templates are provided, templates allowing content creation that conforms to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1) shall be provided for a range of template uses for supported features and, as applicable, to file formats supported by the authoring tool.

Chapter 6: Support Documentation and Services

601 General

601.1 Scope

The technical requirements in Chapter 6 shall apply to ICT support documentation and services where required by 508 Chapter 2 (Scoping Requirements), 255 Chapter 2 (Scoping Requirements), and where otherwise referenced in any other chapter of the Revised 508 Standards or Revised 255 Guidelines.

602 Support Documentation

602.1 General

Documentation that supports the use of ICT shall conform to 602.

602.2 Accessibility and Compatibility Features

Documentation shall list and explain how to use the accessibility and compatibility features required by Chapters 4 and 5. Documentation shall include accessibility features that are built-in and accessibility features that provide compatibility with assistive technology.

602.3 Electronic Support Documentation

Documentation in electronic format, including Web-based self-service support, shall conform to Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0 (incorporated by reference, see 702.10.1).

602.4 Alternate Formats for Non-Electronic Support Documentation

Where support documentation is only provided in non-electronic formats, alternate formats usable by individuals with disabilities shall be provided upon request.

603 Support Services

603.1 General

ICT support services including, but not limited to, help desks, call centers, training services, and automated self-service technical support, shall conform to 603.

603.2 Information on Accessibility and Compatibility Features

ICT support services shall include information on the accessibility and compatibility features required by 602.2.

603.3 Accommodation of Communication Needs

Support services shall be provided directly to the user or through a referral to a point of contact. Such ICT support services shall accommodate the communication needs of individuals with disabilities.

Chapter 7: Referenced Standards

701 General

701.1 Scope

The standards referenced in Chapter 7 shall apply to ICT where required by 508 Chapter 2 (Scoping Requirements), 255 Chapter 2 (Scoping Requirements), and where referenced in any other chapter of the Revised 508 Standards or Revised 255 Guidelines.

702 Incorporation by Reference

702.1 Approved IBR Standards

The Director of the Office of the Federal Register has approved these standards for incorporation by reference into this part in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the referenced standards may be inspected at the U.S. Access Board, 1331 F Street, NW, Suite 1000, Washington, DC 20004, (202) 272-0080, and may also be obtained from the sources listed below. They are also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030 or go to National Archives Code of Federal Regulations Incorporation by Reference *(https://www.archives.gov/federal-register/cfr/ibr-locations.html)*.

702.2 Advanced Television Systems Committee (ATSC)

Copies of the referenced standard may be obtained from the Advanced Television Systems Committee, 1776 K Street NW, Suite 200, Washington, DC 20006–2304.

702.2.1 ATSC A/53 Part 5:2014

Digital Television Standard, Part 5—AC-3 Audio System Characteristics, August 28, 2014.

IBR approved for Appendix C, Section 414.1.1.

702.3 Association for Information and Image Management (AIIM)

Copies of the referenced standard may be obtained from AIIM, 1100 Wayne Ave., Ste. 1100, Silver Spring, Maryland 20910.

702.3.1 ANSI/AIIM/ISO 14289-1-2016

Document Management Applications — Electronic Document File Format Enhancement for Accessibility — Part 1: Use of ISO 32000-1 (PDF/UA-1), ANSI-approved February 8, 2016.

IBR approved for Appendix C, Section 504.2.2.

702.4 Human Factors and Ergonomics Society (HFES)

Copies of the referenced standard may be obtained from the Human Factors and Ergonomics Society, P.O. Box 1369, Santa Monica, CA 90406–1369.

702.4.1 ANSI/HFES 200.2

Human Factors Engineering of Software User Interfaces — Part 2: Accessibility, copyright 2008.

IBR approved for Appendix C, Section 502.4.

702.5 Institute of Electrical and Electronics Engineers (IEEE)

Copies of the referenced standard may be obtained from the Institute of Electrical and Electronics Engineers /h, 10662 Los Vaqueros Circle, P.O. Box 3014, Los Alamitos, CA 90720–1264.

702.5.1 ANSI/IEEE C63.19-2011

American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids, May 27, 2011.

IBR approved for Appendix C, Section 412.3.1.

702.6 International Code Council (ICC)

Copies of the referenced standard may be obtained from ICC Publications /h, 4051 W. Flossmoor Road, Country Club Hills, IL 60478–5795.

702.6.1 ICC A117.1-2009

Accessible and Usable Buildings and Facilities, approved October 20, 2010.

IBR approved for Appendix C, Section 402.5.

702.7 International Telecommunications Union Telecommunications Standardization Sector (ITU-T)

Copies of the referenced standards may be obtained from the International Telecommunication Union /h, Telecommunications Standardization Sector, Place des Nations CH-1211, Geneva 20, Switzerland.

702.7.1 ITU-T Recommendation E.161

Series E. Overall Network Operation, Telephone Service, Service Operation and Human Factors—International operation - Numbering plan of the international telephone service, Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network, February 2001.

IBR approved for Appendix C, Section 407.3.3.

702.7.2 ITU-T Recommendation G.722.2

Series G. Transmission Systems and Media, Digital Systems and Networks – Digital terminal equipment – Coding of analogue signals by methods other than PCM, Wideband coding of speech at around 16 kbit/s using Adaptive Multi-Rate Wideband (AMR-WB), July 2003.

IBR approved for Appendix C, Section 412.4.

702.8 Internet Engineering Task Force (IETF)

Copies of the referenced standard may be obtained from the Internet Engineering Task Force /h.

702.8.1 IETF RFC 6716

Definition of the Opus Codec, September 2012, J.M. Valin, Mozilla Corporation, K. Vos, Skype Technologies S.A., T. Terriberry, Mozilla Corporation.

IBR approved for Appendix C, Section 412.4.

702.9 Telecommunications Industry Association (TIA)

Copies of the referenced standard, published by the Telecommunications Industry Association, may be obtained from IHS Markit /h, 15 Inverness Way East, Englewood, CO 80112.

702.9.1 TIA-1083-B

Telecommunications—Communications Products—Handset Magnetic Measurement Procedures and Performance Requirements, October 2015.

IBR approved for Appendix C, Section 412.3.2.

702.10 Worldwide Web Consortium (W3C)

Copies of the referenced standard may be obtained from the W3C Web Accessibility Initiative, Massachusetts Institute of Technology, 32 Vassar Street, Room 32-G515, Cambridge, MA 02139.

702.10.1 WCAG 2.0

Web Content Accessibility Guidelines (WCAG) 2.0 /h, W3C Recommendation, December 11, 2008.

IBR approved for: Appendix A (Section 508 of the Rehabilitation Act: Application and Scoping Requirements), Sections E205.4, E205.4 Exception, E205.4.1, E207.2, E207.2 Exception 2, E207.2 Exception 3, E207.2.1, E207.3; Appendix B (Section 255 of the Communications Act: Application and Scoping Requirements), C203.1, C203.1 Exception, C203.1.1, C205.2, C205.2 Exception 2, C205.2 Exception 3, C205.2.1, C205.3; and Appendix C (Functional Performance Criteria and Technical Requirements), 408.3 Exception, 501.1 Exception, 504.2, 504.3, 504.4, and 602.3.

Appendix D to Part 1194: Electronic and Information Technology Accessibility Standards as Originally Published on December 21, 2000

[65 FR 80523 *(https://www.federalregister.gov/d/00-32017)*, Dec. 21, 2000. Redesignated and amended at 82 FR 5832 *(https://www.federalregister.gov/d/2017-00395)*, Jan. 18, 2017]

Subpart A — General

§ D1194.1 Purpose.

The purpose of this part is to implement section 508 of the Rehabilitation Act of 1973 *(https://www.access-board.gov/law/ra.html)*, as amended (29 U.S.C. 794d *(https://www.govinfo.gov/app/details/USCODE-2011-title29/USCODE-2011-title29-chap16-subchapV-sec794d)*). Section 508

requires that when Federal agencies develop, procure, maintain, or use electronic and information technology, Federal employees with disabilities have access to and use of information and data that is comparable to the access and use by Federal employees who are not individuals with disabilities, unless an undue burden would be imposed on the agency. Section 508 also requires that individuals with disabilities, who are members of the public seeking information or services from a Federal agency, have access to and use of information and data that is comparable to that provided to the public who are not individuals with disabilities, unless an undue burden would be imposed on the agency.

§ D1194.2 Application.

(a) Products covered by this part shall comply with all applicable provisions of this part. When developing, procuring, maintaining, or using electronic and information technology, each agency shall ensure that the products comply with the applicable provisions of this part, unless an undue burden would be imposed on the agency.

(1) When compliance with the provisions of this part imposes an undue burden, agencies shall provide individuals with disabilities with the information and data involved by an alternative means of access that allows the individual to use the information and data.

(2) When procuring a product, if an agency determines that compliance with any provision of this part imposes an undue burden, the documentation by the agency supporting the procurement shall explain why, and to what extent, compliance with each such provision creates an undue burden.

(b) When procuring a product, each agency shall procure products which comply with the provisions in this part when such products are available in the commercial marketplace or when such products are developed in response to a Government solicitation. Agencies cannot claim a product as a whole is not commercially available because no product in the marketplace meets all the standards. If products are commercially available that meet some but not all of the standards, the agency must procure the product that best meets the standards.

(c) Except as provided by §1194.3(b) *(#d3b)*, this part applies to electronic and information technology developed, procured, maintained, or used by agencies directly or used by a contractor under a contract with an agency which requires the use of such product, or requires the use, to a significant extent, of such product in the performance of a service or the furnishing of a product.

§ 1194.3 General exceptions.

(a) This part does not apply to any electronic and information technology operated by agencies, the function, operation, or use of which involves intelligence activities, cryptologic activities related to national security, command and control of military forces, equipment that is an integral part of a weapon or weapons system, or systems which are critical to the direct fulfillment of military or intelligence missions. Systems which are critical to the direct fulfillment of military or intelligence missions do not include a system that is to be used for routine administrative and business applications (including payroll, finance, logistics, and personnel management applications).

(b) This part does not apply to electronic and information technology that is acquired by a contractor incidental to a contract.

(c) Except as required to comply with the provisions in this part, this part does not require the installation of specific accessibility-related software or the attachment of an assistive technology device at a workstation of a Federal employee who is not an individual with a disability.

(d) When agencies provide access to the public to information or data through electronic and information technology, agencies are not required to make products owned by the agency available for access and use by individuals with disabilities at a location other than that where the electronic and information technology is provided to the public, or to purchase products for access and use by individuals with disabilities at a location other than that where the electronic and information technology is provided to the public.

(e) This part shall not be construed to require a fundamental alteration in the nature of a product or its components.

(f) Products located in spaces frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment are not required to comply with this part.

§ D1194.4 Definitions.

The following definitions apply to this part:

Agency

Any Federal department or agency, including the United States Postal Service.

Alternate formats

Alternate formats usable by people with disabilities may include, but are not limited to, Braille, ASCII text, large print, recorded audio, and electronic formats that comply with this part.

Alternate methods

Different means of providing information, including product documentation, to people with disabilities. Alternate methods may include, but are not limited to, voice, fax, relay service, TTY, Internet posting, captioning, text-to-speech synthesis, and audio description.

Assistive technology

Any item, piece of equipment, or system, whether acquired commercially, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities.

Electronic and information technology

Includes information technology and any equipment or interconnected system or subsystem of equipment, that is used in the creation, conversion, or duplication of data or information. The term electronic and information technology includes, but is not limited to, telecommunications products (such as telephones), information kiosks and transaction machines, World Wide Web sites, multimedia, and office equipment such as copiers and fax machines.The term does not include any equipment that contains embedded information technology that is used as an integral part of the product, but the principal function of which is not the acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. For example, HVAC (heating, ventilation, and air conditioning) equipment such as thermostats or temperature control devices, and medical equipment where information technology is integral to its operation, are not information technology.

Information technology

Any equipment or interconnected system or subsystem of equipment, that is used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. The term information technology includes computers, ancillary equipment, software, firmware and similar procedures, services (including support services), and related resources.

Operable controls

A component of a product that requires physical contact for normal operation. Operable controls include, but are not limited to, mechanically operated controls, input and output trays, card slots, keyboards, or keypads.

Product

Electronic and information technology.

Self Contained, Closed Products

Products that generally have embedded software and are commonly designed in such a fashion that a user cannot easily attach or install assistive technology. These products include, but are not limited to, information kiosks and information transaction machines, copiers, printers, calculators, fax machines, and other similar types of products.

Telecommunications

The transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received.

TTY

An abbreviation for teletypewriter. Machinery or equipment that employs interactive text based communications through the transmission of coded signals across the telephone network. TTYs may include, for example, devices known as TDDs (telecommunication display devices or telecommunication devices for deaf persons) or computers with special modems. TTYs are also called text telephones.

Undue burden

Undue burden means significant difficulty or expense. In determining whether an action would result in an undue burden, an agency shall consider all agency resources available to the program or component for which the product is being developed, procured, maintained, or used.

§ D1194.5 Equivalent facilitation.

Nothing in this part is intended to prevent the use of designs or technologies as alternatives to those prescribed in this part provided they result in substantially equivalent or greater access to and use of a product for people with disabilities.

§ D1194.6 – D1194.20 [Reserved]

Subpart B — Technical Standards

§ D1194.21 Software applications and operating systems.

(a) When software is designed to run on a system that has a keyboard, product functions shall be executable from a keyboard where the function itself or the result of performing a function can be discerned textually.

(b) Applications shall not disrupt or disable activated features of other products that are identified as accessibility features, where those features are developed and documented according to industry standards. Applications also shall not disrupt or disable activated features of any operating system that are identified as accessibility features where the application programming interface for those accessibility features has been documented by the manufacturer of the operating system and is available to the product developer.

(c) A well-defined on-screen indication of the current focus shall be provided that moves among interactive interface elements as the input focus changes. The focus shall be programmatically exposed so that assistive technology can track focus and focus changes.

(d) Sufficient information about a user interface element including the identity, operation and state of the element shall be available to assistive technology. When an image represents a program element, the information conveyed by the image must also be available in text.

(e) When bitmap images are used to identify controls, status indicators, or other programmatic elements, the meaning assigned to those images shall be consistent throughout an application's performance.

(f) Textual information shall be provided through operating system functions for displaying text. The minimum information that shall be made available is text content, text input caret location, and text attributes.

(g) Applications shall not override user selected contrast and color selections and other individual display attributes.

(h) When animation is displayed, the information shall be displayable in at least one non-animated presentation mode at the option of the user.

(i) Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

(j) When a product permits a user to adjust color and contrast settings, a variety of color selections capable of producing a range of contrast levels shall be provided.

(k) Software shall not use flashing or blinking text, objects, or other elements having a flash or blink frequency greater than 2 Hz and lower than 55 Hz.

(l) When electronic forms are used, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

§ 1194.22 Web-based intranet and internet information and applications.

(a) A text equivalent for every non-text element shall be provided (*e.g.*, via "`alt`", "`longdesc`", or in-element content).

(b) Equivalent alternatives for any multimedia presentation shall be synchronized with the presentation.

(c) Web pages shall be designed so that all information conveyed with color is also available without color, for example from context or markup.

(d) Documents shall be organized so they are readable without requiring an associated style sheet.

(e) Redundant text links shall be provided for each active region of a server-side image map.

(f) Client-side image maps shall be provided instead of server-side image maps except where the regions cannot be defined with an available geometric shape.

(g) Row and column headers shall be identified for data tables.

(h) Markup shall be used to associate data cells and header cells for data tables that have two or more logical levels of row or column headers.

(i) Frames shall be titled with text that facilitates frame identification and navigation.

(j) Pages shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.

(k) A text-only page, with equivalent information or functionality, shall be provided to make a web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes.

(l) When pages utilize scripting languages to display content, or to create interface elements, the information provided by the script shall be identified with functional text that can be read by assistive technology.

(m) When a web page requires that an applet, plug-in or other application be present on the client system to interpret page content, the page must provide a link to a plug-in or applet that complies with §1194.21 *(#d21)* (a) through (l).

(n) When electronic forms are designed to be completed on-line, the form shall allow people using assistive technology to access the information, field elements, and functionality required for completion and submission of the form, including all directions and cues.

(o) A method shall be provided that permits users to skip repetitive navigation links.

(p) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.

Note to §1194.22:

1. The Board interprets paragraphs (a) through (k) of this section as consistent with the following priority 1 Checkpoints of the Web Content Accessibility Guidelines 1.0 (WCAG 1.0 (h)) (May 5, 1999) published by the Web Accessibility Initiative of the World Wide Web Consortium:

Section 1194.22 Paragraph	WCAG 1.0 Checkpoint
(a)	1.1
(b)	1.4
(c)	2.1
(d)	6.1
(e)	1.2
(f)	9.1
(g)	5.1
(h)	5.2
(i)	12.1
(j)	7.1
(k)	11.4

2. Paragraphs (l), (m), (n), (o), and (p) of this section are different from WCAG 1.0. Web pages that conform to WCAG 1.0, level A (*i.e.*, all priority 1 checkpoints) must also meet paragraphs (l), (m), (n), (o), and (p) of this section to comply with this section. WCAG 1.0 is available at www.w3.org/TR/1999/WAI-WEBCONTENT-19990505 (h).

§ D1194.23 Telecommunications products.

(a) Telecommunications products or systems which provide a function allowing voice communication and which do not themselves provide a TTY functionality shall provide a standard non-acoustic connection point for TTYs. Microphones shall be capable of being turned on and off to allow the user to intermix speech with TTY use.

(b) Telecommunications products which include voice communication functionality shall support all commonly used cross-manufacturer non-proprietary standard TTY signal protocols.

(c) Voice mail, auto-attendant, and interactive voice response telecommunications systems shall be usable by TTY users with their TTYs.

(d) Voice mail, messaging, auto-attendant, and interactive voice response telecommunications systems that require a response from a user within a time interval, shall give an alert when the time interval is about to run out, and shall provide sufficient time for the user to indicate more time is required.

(e) Where provided, caller identification and similar telecommunications functions shall also be available for users of TTYs, and for users who cannot see displays.

(f) For transmitted voice signals, telecommunications products shall provide a gain adjustable up to a minimum of 20 dB. For incremental volume control, at least one intermediate step of 12 dB of gain shall be provided.

(g) If the telecommunications product allows a user to adjust the receive volume, a function shall be provided to automatically reset the volume to the default level after every use.

(h) Where a telecommunications product delivers output by an audio transducer which is normally held up to the ear, a means for effective magnetic wireless coupling to hearing technologies shall be provided.

(i) Interference to hearing technologies (including hearing aids, cochlear implants, and assistive listening devices) shall be reduced to the lowest possible level that allows a user of hearing technologies to utilize the telecommunications product.

(j) Products that transmit or conduct information or communication, shall pass through cross-manufacturer, non-proprietary, industry-standard codes, translation protocols, formats or other information necessary to provide the information or communication in a usable format. Technologies which use encoding, signal compression, format transformation, or similar techniques shall not remove information needed for access or shall restore it upon delivery.

(k) Products which have mechanically operated controls or keys, shall comply with the following:

(1) Controls and keys shall be tactilely discernible without activating the controls or keys.

(2) Controls and keys shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls and keys shall be 5 lbs. (22.2 N) maximum.

(3) If key repeat is supported, the delay before repeat shall be adjustable to at least 2 seconds. Key repeat rate shall be adjustable to 2 seconds per character.

(4) The status of all locking or toggle controls or keys shall be visually discernible, and discernible either through touch or sound.

§ D1194.24 Video and multimedia products.

(a) All analog television displays 13 inches and larger, and computer equipment that includes analog television receiver or display circuitry, shall be equipped with caption decoder circuitry which appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals. As soon as practicable, but not later than July 1, 2002, widescreen digital television (DTV) displays measuring at least 7.8 inches vertically, DTV sets with conventional displays measuring at least 13 inches vertically, and stand-alone DTV tuners, whether or not they are marketed with display screens, and computer equipment that includes DTV receiver or display circuitry, shall be equipped with caption decoder circuitry which appropriately receives, decodes, and displays closed captions from broadcast, cable, videotape, and DVD signals.

(b) Television tuners, including tuner cards for use in computers, shall be equipped with secondary audio program playback circuitry.

(c) All training and informational video and multimedia productions which support the agency's mission, regardless of format, that contain speech or other audio information necessary for the comprehension of the content, shall be open or closed captioned.

(d) All training and informational video and multimedia productions which support the agency's mission, regardless of format, that contain visual information necessary for the comprehension of the content, shall be audio described.

(e) Display or presentation of alternate text presentation or audio descriptions shall be user-selectable unless permanent.

§ 1194.25 Self contained, closed products.

(a) Self contained products shall be usable by people with disabilities without requiring an end-user to attach assistive technology to the product. Personal headsets for private listening are not assistive technology.

(b) When a timed response is required, the user shall be alerted and given sufficient time to indicate more time is required.

(c) Where a product utilizes touchscreens or contact-sensitive controls, an input method shall be provided that complies with §1194.23 (k) (1) through (4).

(d) When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, shall also be provided.

(e) When products provide auditory output, the audio signal shall be provided at a standard signal level through an industry standard connector that will allow for private listening. The product must provide the ability to interrupt, pause, and restart the audio at anytime.

(f) When products deliver voice output in a public area, incremental volume control shall be provided with output amplification up to a level of at least 65 dB. Where the ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level shall be user selectable. A function shall be provided to automatically reset the volume to the default level after every use.

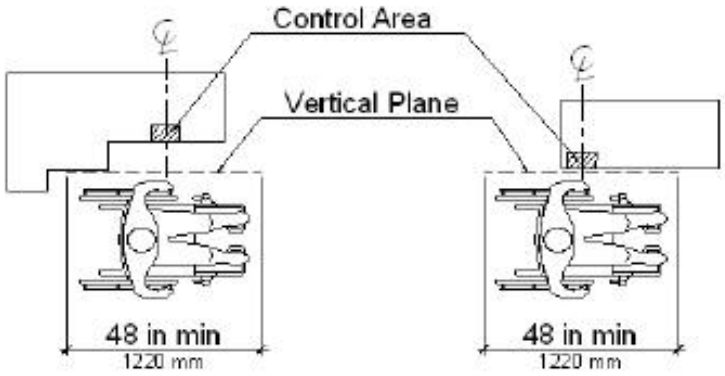
(g) Color coding shall not be used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.

(h) When a product permits a user to adjust color and contrast settings, a range of color selections capable of producing a variety of contrast levels shall be provided.

(i) Products shall be designed to avoid causing the screen to flicker with a frequency greater than 2 Hz and lower than 55 Hz.

(j) Products which are freestanding, non-portable, and intended to be used in one location and which have operable controls shall comply with the following:

(1) The position of any operable control shall be determined with respect to a vertical plane, which is 48 inches in length, centered on the operable control, and at the maximum protrusion of the product within the 48 inch length (see Figure 1 of this part).



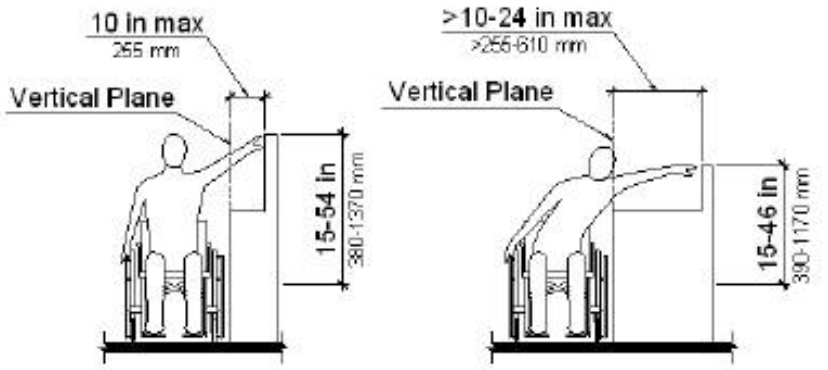
Vertical Plane Relative to the Operable Control

Figure 1

(2) Where any operable control is 10 inches or less behind the reference plane, the height shall be 54 inches maximum and 15 inches minimum above the floor.

(3) Where any operable control is more than 10 inches and not more than 24 inches behind the reference plane, the height shall be 46 inches maximum and 15 inches minimum above the floor.

(4) Operable controls shall not be more than 24 inches behind the reference plane (see Figure 2 of this part).



Height of Operable Control Relative to the Vertical Plane

Figure 2

§ D1194.26 Desktop and portable computers.

(a) All mechanically operated controls and keys shall comply with §1194.23 (k) *(#d23k)* (1) through(4).

(b) If a product utilizes touchscreens or touch-operated controls, an input method shall be provided that complies with § 1194.23 (k) *(#d23k)* (1) through (4).

(c) When biometric forms of user identification or control are used, an alternative form of identification or activation, which does not require the user to possess particular biological characteristics, shall also be provided.

(d) Where provided, at least one of each type of expansion slots, ports and connectors shall comply with publicly available industry standards.

§§ D1194.27 – D1194.30 [Reserved]

Subpart C — Functional Performance Criteria

§ D1194.31 Functional performance criteria.

(a) At least one mode of operation and information retrieval that does not require user vision shall be provided, or support for assistive technology used by people who are blind or visually impaired shall be provided.

(b) At least one mode of operation and information retrieval that does not require visual acuity greater than 20/70 shall be provided in audio and enlarged print output working together or independently, or support for assistive technology used by people who are visually impaired shall be provided.

(c) At least one mode of operation and information retrieval that does not require user hearing shall be provided, or support for assistive technology used by people who are deaf or hard of hearing shall be provided.

(d) Where audio information is important for the use of a product, at least one mode of operation and information retrieval shall be provided in an enhanced auditory fashion, or support for assistive hearing devices shall be provided.

(e) At least one mode of operation and information retrieval that does not require user speech shall be provided, or support for assistive technology used by people with disabilities shall be provided.

(f) At least one mode of operation and information retrieval that does not require fine motor control or simultaneous actions and that is operable with limited reach and strength shall be provided.

§§ D1194.32 – D1194.40 [Reserved]

Subpart D — Information, Documentation, and Support

§ D1194.41 Information, documentation, and support.

(a) Product support documentation provided to end-users shall be made available in alternate formats upon request, at no additional charge.

(b) End-users shall have access to a description of the accessibility and compatibility features of products in alternate formats or alternate methods upon request, at no additional charge.

(c) Support services for products shall accommodate the communication needs of end-users with disabilities.

Preamble to the Final Rule

Published in the Federal Register *(https://federalregister.gov/d/2017-00395)* on January 18, 2017 and amended *(https://federalregister.gov/d/2018-00848)* on March 23, 2018.

36 CFR Parts 1193 and 1194
RIN 3014-AA37

Information and Communication Technology (ICT) Standards and Guidelines

AGENCY: Architectural and Transportation Barriers Compliance Board.

ACTION: Final rule.

SUMMARY: We, the Architectural and Transportation Barriers Compliance Board (Access Board or Board), are revising and updating, in a single rulemaking, our standards for electronic and information technology developed, procured, maintained, or used by Federal agencies covered by section 508 of the Rehabilitation Act of 1973, as well as our guidelines for telecommunications equipment and customer premises equipment covered by Section 255 of the Communications Act of 1934. The revisions and updates to the section 508-based standards and section 255-based guidelines are intended to ensure that information and communication technology covered by the respective statutes is accessible to and usable by individuals with disabilities.

DATE: This final rule is effective March 20, 2017. [*Note*: The Board changed the effective date to March 21, 2017, as indicated in a notice *(https://federalregister.gov/d/2017-04059)* published on March 2, 2017.] However, compliance with the section 508-based standards is not required until January 18, 2018. Compliance with the section 255-based guidelines is not required until the guidelines are adopted by the Federal Communications Commission. The incorporation by reference of certain publications listed in the final rule is approved by the Director of the Federal Register as of March 20, 2017.

FOR FURTHER INFORMATION CONTACT: Timothy Creagan, Access Board, 1331 F Street NW, Suite 1000, Washington, DC 20004–1111. Telephone: (202) 272–0016 (voice) or (202) 272–0074 (TTY). Or Bruce Bailey, Access Board, 1331 F Street, NW, Suite 1000, Washington, DC 20004-1111. Telephone: (202) 272–0024 (voice) or (202) 272–0070 (TTY) E-mail addresses: 508@access-board.gov *(mailto:508@access-board.gov)*.

SUPPLEMENTARY INFORMATION:

I. Executive Summary

A. Purpose and Legal Authority

In this final rule, the Access Board is updating its existing Electronic and Information Technology Accessibility Standards under section 508 of the Rehabilitation Act of 1973, ("508 Standards"), as well as our Telecommunications Act Accessibility Guidelines under Section 255 of the Communications Act of 1934 ("255 Guidelines"). Given the passage of nearly two decades since their issuance, the existing 508 Standards and 255 Guidelines are in need of a "refresh" in several important respects. This final rule is intended to, among other things, address advances in information and communication technology that have occurred since the guidelines and standards were issued in 1998 and 2000 respectively, harmonize with accessibility standards developed by standards organizations worldwide in recent years, and ensure consistency with the Board's regulations that have been promulgated since the late 1990s. The Revised 508 Standards and 255 Guidelines support the access needs of individuals with disabilities, while also taking into account the costs of providing accessible information and communication technology to Federal agencies, as well as manufacturers of telecommunications equipment and customer premises equipment.

The final rule also reflects a significantly revamped organizational structure relative to the existing standards and guidelines. In sum, the final rule eliminates 36 CFR part 1193 (which formerly housed the existing 255 Guidelines) and substantially revises 36 CFR 1194 by replacing the existing 508 Standards with two regulatory provisions—§§ 1194.1 and 1194.2—that direct readers to the four appendices accompanying part 1194, which, in turn, set forth the scoping and technical requirements for the Revised 508 Standards and 255 Guidelines. Appendix A provides general application and scoping for Section 508, while Appendix B does likewise for Section 255. Appendix C contains seven separate chapters setting forth the functional performance criteria and technical accessibility standards that apply to both 508-covered and 255-covered ICT. These chapters are, generally speaking, broken down by functional area (e.g., functional performance criteria, hardware, software, support documentation and services). Lastly, Appendix D republishes the existing 508 Standards, which, as discussed below, may be needed to evaluate Section 508-covered existing (legacy) ICT under the safe harbor provision.

In this preamble, the Board refers to provisions in the Revised 508 Standards and 255 Guidelines by their new section numbers under this final rule: E101–E103 (508 Chapter 1: Application and Administration); E201–E208 (508 Chapter 2: Scoping Requirements); C101–C103 (255 Chapter 1: Application and Administration); C201–C206 (255 Chapter 2: Scoping Requirements); 301–302 (Chapter 3: Functional Performance Criteria); 401–415 (Chapter 4: Hardware); 501–504 (Chapter 5: Software); 601–603 (Support Documentation and Services); and 701–702 (Chapter 7: Referenced Standards).

Additionally, the term "information and communication technology" (ICT) is used widely throughout this preamble. Unless otherwise noted, it is intended to broadly encompass electronic and information technology covered by Section 508, as well as telecommunications products, interconnected Voice over Internet Protocol (VoIP) products, and Customer Premises Equipment (CPE) covered by Section 255. Examples of ICT include computers, information kiosks and transaction machines, telecommunications equipment, multifunction office machines, software, Web sites, and electronic documents.

1. Legal Authority for the Revised 508 Standards

Section 508 of the Rehabilitation Act of 1973 (hereafter, "Section 508"), as amended, mandates that Federal agencies "develop, procure, maintain, or use" ICT in a manner that ensures Federal employees with disabilities have comparable access to, and use of, such information and data relative to other Federal employees, unless doing so would impose an undue burden. 29 U.S.C. 794d. Section 508 also requires Federal agencies to ensure that members of the public with disabilities have comparable access to publicly-available information and services unless doing so would impose an undue burden on the agency. Id. In accordance with section 508(a)(2)(A), the Access Board must publish standards that define electronic and information technology along with the technical and functional performance criteria necessary for accessibility, and periodically review and amend the standards as appropriate. When the Board revises its existing 508 Standards (whether to keep up with technological changes or otherwise), Section 508 mandates that, within six months, both the Federal Acquisition Regulatory Council (FAR Council) and Federal agencies incorporate these revised standards into their respective acquisition regulations and procurement policies and directives. Thus, with respect to procurement-related matters, the Access Board's 508 Standards are not self-enforcing; rather, these standards take legal effect when adopted by the FAR Council.

2. Legal Authority for 255 Guidelines

Section 255 of the Communications Act (hereafter, "Section 255"), requires telecommunications equipment and services to be accessible to, and usable by, individuals with disabilities, where readily achievable. 47 U.S.C. 255. "Readily achievable" is defined in the statute as "easily accomplishable and able to be carried out without much difficulty or expense." Id. In determining whether an access feature is readily achievable, the Federal Communications Commission (FCC), which has exclusive implementation and enforcement authority under Section 255, has directed telecommunications equipment manufacturers and service providers to weigh the nature and cost of that feature against the individual company's overall financial resources, taking into account such factors as the type, size, and nature of its business operation. Section 255 tasks the Access Board, in conjunction with the FCC, with the development of guidelines for the accessibility of telecommunications equipment and customer premises equipment, as well as their periodic review and update. The FCC, however, has exclusive authority under Section 255 to issue implementing regulations and carry out enforcement activities. Moreover, when issuing implementing regulations, the FCC is not bound to adopt the Access Board's guidelines as its own or to use them as minimum requirements.

B. Summary of Key Provisions

The Revised 508 Standards and 255 Guidelines replace the current product-based regulatory approach with an approach based on ICT functions. The revised technical requirements, which are organized along the lines of ICT functionality, provide requirements to ensure that covered hardware, software, electronic content, and support documentation and services are accessible to people with disabilities. In addition, the revised requirements include functional performance criteria, which are outcome-based provisions that apply in two limited instances: when the technical requirements do not address one or more features of ICT or when evaluation of an alternative design or technology is needed under equivalent facilitation.

Some of the key provisions and updates reflected in the Revised 508 Standards and 255 Guidelines (relative to the existing standards and guidelines) include:

1. New Regulatory Approach and Format

Technological advances over the past two decades have resulted in the widespread use of multifunction devices that called into question the ongoing utility of the product-by-product approach used in the Board's existing 508 Standards and 255 Guidelines. Consequently, one of the primary purposes of the final rule is to replace the current product-based approach with requirements based on functionality, and, thereby, ensure that accessibility for people with disabilities keeps pace with advances in ICT. To ensure that compliance under both laws, to the maximum extent possible, can be measured against a common set of technical requirements, the implementing regulations have been consolidated into a single part: 36 CFR part 1194. The two sections in this part (§§ 1194.1 and 1194.2), in turn, direct readers to the four separate appendices (Appendices A–D) that set forth the scoping and technical requirements under Sections 508 and 255, respectively. As discussed below, this is a new organizational format for the 508 Standards and 255 Guidelines that mirrors the formatting of other standards and guidelines issued by the Access Board over the past decade.

The new organizational format in the Revised 508 Standards and 255 Guidelines—which sets forth scoping and technical requirements in four appendices—is modeled after the regulatory approach first used Access Board's 2004 Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines. Appendix A applies only to Section 508-covered ICT and consists of 508 Chapter 1, which sets forth general application and administration provisions, while 508 Chapter 2 contains scoping requirements (which, in turn, prescribe which ICT – and, in some cases, how many – must comply with the technical specifications). Appendix B, which applies to 255-covered ICT only, is organized similarly with 255 Chapter 1 setting forth general application and administration provisions and 255 Chapter 2 containing scoping requirements. Appendix C sets forth technical specifications that apply equally to ICT covered under Sections 508 or 255. Appendix C includes five chapters, each of which (with the exception of the final chapter) address a separate ICT functional area. These chapters are: Chapter 3: Functional Performance Criteria; Chapter 4: Hardware; Chapter 5: Software; Chapter 6: Support Documentation and Services; and Chapter 7: Referenced Standards. Lastly, in Appendix D, the existing 508 Standards are republished in full (albeit with a revised section numbering system) for reference when evaluating Section 508-covered existing (legacy) ICT under the "safe harbor" provision. See discussion infra Section IV.B (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 2: Scoping Requirements – E202 General Exceptions).

2. Broad Application of Web Content Accessibility Guidelines 2.0

The Revised 508 Standards and 255 Guidelines incorporate by reference the Web Content Accessibility Guidelines (WCAG) 2.0, a globally-recognized and technologically-neutral set of accessibility guidelines for Web content. For Section 508-covered ICT, all covered Web and non-Web content and software – including, for example, Web sites, intranets, word processing documents, portable document format documents, and project management software – is required, with a few specific exceptions, to conform to WCAG 2.0's Level A and Level AA Success Criteria and Conformance Requirements. By applying a single set of requirements to Web sites, electronic documents, and software, the revised requirements adapt the existing 508 Standards to reflect the newer multifunction technologies (e.g., smartphones that have telecommunications functions, video cameras, and computer-like data processing capabilities) and address the accessibility challenges that these technologies pose for individuals with disabilities. For Section 255-covered ICT, electronic content and software that is integral to the use of telecommunications and customer premise equipment is required to conform to WCAG 2.0's Level A and Level AA Success Criteria and Conformance Requirements. There are several exceptions related to non-Web documents and software.

3. Harmonization with International Standards

From the outset, one of the Access Board's primary goals in this rulemaking has been to increase harmonization with international standards relating to ICT accessibility that have been developed worldwide over the past decade. Some of these standards (such as WCAG 2.0) are incorporated by reference in the Revised 508 Standards and 255 Guidelines. For other standards (such as EN 301 549, which is the European accessibility standard for public ICT procurement), harmonization comes in the form of ensuring that the relevant accessibility specifications in such standard and the final rule can both be met simultaneously without conflict. Harmonization with international standards and guidelines creates a larger marketplace for accessibility solutions, thereby attracting more offerings and increasing the likelihood of commercial availability of accessible ICT options.

4. Delineation of covered electronic "content"

The Revised 508 Standards specify that all types of public-facing content, as well as nine categories of non-public-facing content that communicate agency official business, have to be accessible, with "content" encompassing all forms of electronic information and data. The existing standards require Federal agencies to make electronic information and data accessible, but do not delineate clearly the scope of covered information and data. As a result, document accessibility has been inconsistent across Federal agencies. By focusing on public-facing

content and certain types of agency official communications that are not public facing, the revised requirements bring needed clarity to the scope of electronic content covered by the 508 Standards and, thereby, help Federal agencies make electronic content accessible more consistently.

5. Expanded interoperability requirements

The existing standards require ICT to be compatible with assistive technology – that is, hardware or software that increases or maintains functional capabilities of individuals with disabilities (e.g., screen magnifiers or refreshable braille displays). However, in the past the existing requirement resulted in ambiguity of application. For example, some agencies interpreted the provisions of existing 36 CFR § 1194.21 (which addresses software applications and operating systems) as applicable to assistive technology itself. The ensuing confusion led, in some cases, to unnecessary delay in procurements intended to provide reasonable accommodations to employees under Section 501, creating a hardship for both agencies and their employees with disabilities. The final rule provides more specificity about how operating systems, software development toolkits, and software applications should interact with assistive technology. The final rule also specifically exempts assistive technology from the interoperability provisions. The Board expects the final rule to improve software interoperability with assistive technology, allowing users better access to the functionalities that ICT products provide.

6. Extended Compliance Date and Incorporation of Safe Harbor Provision for Section 508-Covered Legacy ICT

Federal agencies will have one year from publication of this final rule to comply with the Revised 508 Standards. This extended period for compliance is responsive to some agencies' concerns about the time it will take them to make ICT compliant with the Revised 508 Standards. In addition, the Revised 508 Standards include a "safe harbor" provision for existing (i.e., legacy) ICT. Under this safe harbor, unaltered, existing ICT (including content) that complies with the existing 508 Standards need not be modified or upgraded to conform to the Revised 508 Standards. This safe harbor applies on an element-by-element basis in that each component or portion of existing ICT is assessed separately. Corresponding definitions have also been added for "existing ICT" and "alteration." By incorporating a safe harbor for legacy ICT into the Revised 508 Standards provision, the Board is being responsive to agencies' concerns about the potential resources required to remediate existing ICT, including agency Web sites or other public-facing legacy documents. Notably, the extended compliance date and safe harbor provision apply only to Section 508-covered ICT; these provisions do not apply to telecommunications equipment and customer premises equipment covered by Section 255. Since compliance with the Revised 255 Guidelines is not required unless and until they are adopted by the FCC, matters addressed in these two provisions fall within the commission's province.

C. Summary of Final Regulatory Impact Analysis

Consistent with the obligation under Executive Orders 12866 and 13563 that Federal agencies promulgate regulations only upon a reasoned determination that benefits justify costs, the final rule has been evaluated from a benefit-cost perspective in a final regulatory impact analysis (Final RIA) prepared by the Board's consulting economic firm. The focus of the Final RIA is to define and, where possible, quantify and monetize the potential incremental benefits and costs of the Revised 508 Standards and 255 Guidelines. We summarize its methodology and results below. A complete copy of this regulatory assessment is available on the Access Board's Web site (https://www.access-board.gov/ *(https://www.access-board.gov/)*), and also on the Federal Government's online rulemaking portal (https://www.regulations.gov/ *(https://www.regulations.gov/)*).

To estimate likely incremental compliance costs attributable to the final rule, the Final RIA estimates, quantifies, and monetizes costs in the following broad areas: (1) costs to Federal agencies and contractors related to policy development, employee training, development of accessible ICT, evaluation of ICT, and creation of accessible electronic documents; (2) costs to Federal agencies of ensuring that speech-output enabled hardware with closed functionality has braille instructions (e.g., small braille label or sign) indicating how to initiate the speech mode of operation; and (3) costs to manufacturers of telecommunications equipment and customer premises equipment of ensuring that their respective Web sites and electronic support documentation conform to accessibility standards, including WCAG 2.0.

On the benefits side, the Final RIA estimates likely incremental benefits by monetizing the value of three categories of benefits expected to accrue from the Revised 508 Standards: (a) increased productivity of Federal employees with certain disabilities who are expected to benefit from improved ICT accessibility; (b) time saved by members of the public with certain disabilities when using more accessible Federal Web sites; and (c) reduced phone calls to Federal agencies as members of the public with certain disabilities shift their inquiries and transactions online due to improved accessibility of Federal Web sites. The Final RIA, for analytical purposes, defines the beneficiary population as persons with vision, hearing, speech, learning, and intellectual disabilities, as well as those with manipulation, reach, or strength limitations. The Final RIA does not formally quantify or monetize benefits accruing from the Revised 255 Guidelines due to insufficient data and methodological constraints.

Table 1 below summarizes the results from the Final RIA with respect to the likely monetized benefits and costs, on an annualized basis, from the Revised 508 Standards and 255 Guidelines. All monetized benefits and costs are incremental to the applicable baseline, and were estimated for a

10-year time horizon (starting in 2018 since the final rule requires Federal agencies to comply one year after its publication) and converted to annualized values using discount rates of 7 and 3 percent. Three scenarios of incremental benefits and costs are presented using alternative parameters that are assumptions-based. These scenarios include: a low net benefit scenario (using parameters which results in lower benefits and higher costs), an expected scenario (consisting of expected values for assumed parameters), and a high net benefit scenario (using parameters which results in higher benefits and lower costs).

Table 1 - Annualized Value of Monetized Benefits and Costs under the Final Rule, 2018-2027 (in 2017 dollars)

Type of Benefits or Costs	Scenario	7% Discount Rate (in millions)	3% Discount Rate (in millions)
Monetized incremental benefits to Federal agencies and members of the public with certain disabilities (under Revised 508 Standards)	Low Net Benefit Scenario	$32.0	$34.0
	Expected Scenario	**$72.4**	**$77.0**
	High Net Benefit Scenario	$187.4	$199.0
Monetized incremental costs to Federal agencies (under Revised 508 Standards)	Low Net Benefit Scenario	$276.2	$287.4
	Expected Scenario	**$172.8**	**$181.1**
	High Net Benefit Scenario	$111.5	$117.2
Monetized incremental costs to telecommunications equipment and CPE manufacturers (under Revised 255 Guidelines)	Low Net Benefit Scenario	$9.5	$9.6
	Expected Scenario	**$9.5**	**$9.6**
	High Net Benefit Scenario	$9.5	$9.6

While the Final RIA monetizes likely incremental benefits and costs attributable to the final rule, this represents only part of the regulatory picture. Today, though ICT is now woven into the very fabric of everyday life, millions of Americans with disabilities often find themselves unable to use – or use effectively – computers, mobile devices, Federal agency Web sites, or electronic content. The Board's existing standards and guidelines are greatly in need of a "refresh" to keep up with technological changes over the past fifteen years. The Board expects this final rule to be a major step toward ensuring that ICT is more accessible to and usable by individuals with disabilities – both in the Federal workplace and society generally. Indeed, much – if not most – of the significant benefits expected to accrue from the final rule are difficult, if not impossible, to quantify, including: greater social equality, human dignity, and fairness. Each of these values is explicitly recognized by Executive Order 13563 as important qualitative considerations in regulatory analyses.

Moreover, American companies that manufacture telecommunications equipment and ICT-related products will likely derive significant benefits from the Access Board's concerted efforts to harmonize the accessibility requirements in the Revised 508 Standards and 255 Guidelines with voluntary consensus standards. Given the relative lack of existing national and globally-recognized standards for accessibility of mobile technologies, telecommunications equipment manufacturers will, we believe, greatly benefit from harmonization of the Revised 255 Guidelines with consensus standards. Similar benefits will likely accrue more generally to manufacturers of all ICT-related products as a result of harmonization.

It is also equally important to note that some potentially substantial incremental costs arising from the final rule are not evaluated in the Final RIA, either because such costs could not be quantified or monetized (due to lack of data or for other methodological reasons) or are inherently qualitative. For example, due to lack of information, the Final RIA does not assess the cost impact of new or revised requirements in the Revised 255 Guidelines on computer and telecommunications equipment manufacturers. A more in-depth discussion of the Final RIA can be found in Section V.A (Regulatory Process Matters – Final Regulatory Impact Analysis).

II. Rulemaking History

A. Existing 508 Standards and 255 Guidelines (1998–2000)

The Access Board issued the existing 255 Guidelines for telecommunications equipment and customer premises equipment in 1998. Telecommunications Act Accessibility Guidelines, 63 FR 5608 (Feb. 3, 1998) (codified at 36 CFR part 1193). Two years later, in 2000, the Board published the existing 508 Standards. Electronic and Information Technology Accessibility Standards, 65 FR 80499 (Dec. 21, 2000) (codified at 36 CFR part 1194). In this preamble, all citations to 36 CFR part 1193 refer to the existing 255 Guidelines in force since 1998, while all citations to 36 CFR Part 1194 refer to the existing 508 Standards in force since 2000.

The existing 508 Standards require Federal agencies to ensure that persons with disabilities — namely, Federal employees with disabilities and members of the public with disabilities — have comparable access to, and use of, electronic and information technology (regardless of the type of medium) absent a showing of undue burden. 36 CFR Part 1194. Among other things, these standards: define key terms (such as "electronic and information technology" and "undue burden"); establish technical requirements and functional performance criteria for covered electronic and information technologies; require agencies to document undue burden determinations when procuring covered products; and mandate accessibility of support documentation and services. Generally speaking, the existing 508 Standards take a product-based regulatory approach in that technical requirements for electronic and information technology are grouped by product type: software applications and operating systems; Web-based intranet and Internet information and applications; telecommunications products; self-contained, closed products; and desktop and portable computers.

The existing 255 Guidelines require manufacturers of telecommunications equipment and customer premises equipment to ensure that new and substantially upgraded existing equipment is accessible to, and usable by, individuals with disabilities when readily achievable. 36 CFR part 1193. The existing guidelines, as with the 508 Standards, define key terms (such as "telecommunications equipment" and "readily achievable") and establish technical requirements for covered equipment, software, and support documentation. These guidelines also require manufacturers of covered equipment to consider inclusion of individuals with disabilities in their respective processes for product design, testing, trials, or market research.

B. TEITAC Advisory Committee (2006–2008)

In the years following our initial promulgation of the existing 508 Standards and 255 Guidelines, technology has continued to evolve at a rapid pace. Pursuant to our statutory mandate, the Access Board deemed it necessary and appropriate to review and update the existing 508 Standards and 255 Guidelines in order to make them consistent with one another and reflective of technological changes. In 2006, the Board formed the Telecommunications and Electronic and Information Technology Advisory Committee (hereafter, "TEITAC Advisory Committee") to assist in the process of revising and updating the existing 508 Standards and 255 Guidelines. See Notice of Establishment, 71 FR 38324 (July 6, 2006). The TEITAC Advisory Committee's 41 members comprised a broad cross-section of stakeholders representing industry, disability groups, and Government agencies. This Advisory Committee also included international representatives from the European Commission, Canada, Australia, and Japan. The TEITAC Advisory Committee recognized the importance of standardization across markets worldwide and coordinated its work with standard-setting bodies in the U.S. and abroad, such as the World Wide Web Consortium (W3C®), and with the European Commission. The TEITAC Advisory Committee addressed a range of issues, including new or convergent technologies, market forces, and international harmonization.

In April 2008, the TEITAC Advisory Committee issued its final report to the Access Board (hereafter, "TEITAC Report"). See Advisory Committee Report, U.S. Access Board (Apr. 2008), http://www.access-board.gov/teitac-report *(https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/background/teitac-report)* (last accessed Aug. 23, 2016). This TEITAC Report provided a set of recommended updates to the existing 508 Standards and 255 Guidelines, which, the committee noted, were intended to balance two competing considerations: the need for clear and specific standards that facilitate compliance, and the recognition that static standards "consisting of design specification[s] and fixed checklists" would tend to "stifle innovation" and "delay the availability of technology advancements to people with disabilities." Id. at Section 1. To address these considerations, the TEITAC Advisory Committee recommended that the Access Board jettison its existing product-based regulatory approach in favor of technical requirements to achieve accessibility based on ICT functions or features. Id. The Committee also noted the importance of harmonizing with international standards to both spur development of accessible ICT products and reduce manufacturers' costs in the global market. Id. at Sections 4 & 4.3. To that end, the Committee worked to harmonize its recommendations with the then-draft WCAG 2.0. Id. at Sections 4.3 & 8.2.

All told, the TEITAC Report provided a comprehensive recommended set of technical requirements applicable to a broad range of ICT functions and features, including: closed functionality; hardware with and without speech output; user interfaces; electronic content; processing and display of captions and audio description; RTT; authoring tools; and, product support documentation and services.

C. First Advance Notice of Proposed Rulemaking (2010)

1. General

Following publication of the TEITAC Report, the Access Board worked to develop a proposed rule that would "refresh" the existing its existing 508 Standards and 255 Guidelines. In March 2010, we issued an Advance Notice of Proposed Rulemaking (2010 ANPRM) inviting public comment on an initial set of draft revisions to the standards and guidelines. See Advance Notice of Proposed Rulemaking, 75 FR 13457 (proposed Mar. 22, 2010); see also Draft Information and Communication Technology (ICT) Standards and Guidelines, U.S. Access Board, https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/background/draft-rule-2010 *(https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/proposed-rule)* (last accessed Aug. 23, 2016).

In sum, the 2010 ANPRM proposed a set of accessibility requirements that largely tracked the TEITAC Report's recommendations. While the majority of the proposed requirements in the draft rule were not substantively changed from the existing 508 Standards and 255 Guidelines, there were some notable proposed substantive revisions. Two of the most significant were the proposals to require that Federal agencies make electronic content of specified official communications accessible, and to harmonize with WCAG 2.0 by restating the Level AA Success Criteria and Conformance Requirements in regulatory (mandatory) terms in the draft rule. Additionally, the 2010 ANPRM—in keeping with the TEITAC Report—also sought to substantially update the structure and organization of the existing regulations. In the draft rule, the proposed standards and guidelines shared a common set of functional performance criteria (Chapter 2) and technical design criteria (Chapters 3-10), but had separate introductory chapters (Chapters 1 and 2), which outlined the respective scoping, application, and definitions for the revised 508 Standards and 255 Guidelines.

2. Public Hearings and Comments

The Access Board held two public hearings on the 2010 ANPRM — March 2010 (San Diego, CA) and July 2010 (Washington, DC). We also received 384 written comments during the comment period. Comments came from industry, Federal and state governments, foreign and domestic companies specializing in information technology, disability advocacy groups, manufacturers of hardware and software, trade associations, institutions of higher education, research and trade organizations, accessibility consultants, assistive technology industry and related organizations, and individuals.

In general, commenters agreed with our approach to addressing the accessibility of ICT through functionality rather than discrete product types. Commenters also expressed strong support for our efforts to update the existing 508 Standards and 255 Guidelines, as well as our decision to follow the TEITAC Advisory Committee's recommendation to require harmonization with WCAG 2.0. However, many commenters expressed concern that the 2010 ANPRM was not user-friendly, e.g., that it was too long (at close to 100 pages), organized in a confusing manner, and suffered from some internal inconsistencies. For example, commenters noted confusion by virtue of the fact that some chapters focused on functional features of accessibility while others addressed specific types of technology, or that the meaning of "ICT" seemed to vary depending on the context of the specific chapter. Other commenters opined that deviations from WCAG 2.0 phrasing in the draft rule created ambiguities, particularly for those well familiar with WCAG 2.0.

D. Second Advance Notice of Proposed Rulemaking (2011 ANPRM)

1. General

By the following year, in 2011, the Access Board was poised to invite public comment on a revised version of the draft rule. The Board acknowledged that, based on comments to the 2010 ANPRM, the draft rule needed to be reorganized and made more concise. More importantly, we needed to obtain further comment on major issues and harmonize with the European Commission's ICT standardization efforts that were already underway at that time. Consequently, the Board issued a second Advance Notice of Proposed Rulemaking (2011 ANPRM). See Advance Notice of Proposed Rulemaking, 76 FR 76640 (proposed Dec. 8, 2011); Draft Updated Standards and Guidelines (2011), U.S. Access Board, https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/draft-rule-2011. *(https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/draft-rule-2011)*

In the 2011 ANPRM, the Access Board substantially revamped the structure and organization of the draft rule. To address comments criticizing the length and organization of the 2010 ANPRM as unwieldy, the revised draft rule consolidated and streamlined provisions into six chapters (from ten), consolidated advisories, and reduced the page count from close to 100 to less than 50. We also made revisions to improve the clarity of various proposed provisions and ensure a consistent organizational structure throughout this draft rule. See, e.g., U.S. Access Board, Information and Communication Technology Standards and Guidelines; Proposed Rule (NPRM), 80 FR 10880, 10884–93 (Feb. 27, 2015) (providing detailed comparison of 2010 and 2011 ANPRMs). Additionally, to address commenters' collective concern that rephrasing of WCAG 2.0

requirements introduced ambiguities, the revised draft rule proposed to apply WCAG 2.0's requirements through incorporation by reference rather than restating its requirements in the technical provisions for Web and non-Web content, documents, and user applications.

In issuing the 2011 ANPRM, the Access Board also took notice of the standardization work going on in Europe at the time, stating:
[T]he Board is interested in harmonizing with standards efforts around the world in a timely way. Accordingly, the Board is now releasing this second Advance Notice of Proposed Rulemaking (2011 ANPRM) to seek further comment on specific questions and to harmonize with contemporaneous standardization efforts underway by the European Commission.
2011 ANPRM, 76 FR at 76642.

2. Public Hearings and Comments

Hearings were held in January 2012 in Washington, DC and in March 2012 in San Diego, CA. Additionally, 91 written comments were received in response to the 2011 ANPRM. Comments came from industry, Federal and state governments, foreign and domestic companies specializing in information technology, disability advocacy groups, manufacturers of hardware and software, trade associations and trade organizations, institutions of higher education and research, accessibility consultants, assistive technology industry and related organizations, and individual stakeholders who did not identify with any of these groups.

In general, commenters continued to agree with our approach to address ICT accessibility by focusing on features, rather than discrete product types. Commenters supported the conciseness of the proposed provisions in the 2011 ANPRM, and asked for further streamlining where possible. Commenters also generally voiced strong support for the Board's decision to incorporate by reference WCAG 2.0 and apply it to all types of covered ICT; several commenters did, however, question the propriety of applying WCAG 2.0 to non-Web ICT.

E. Notice of Proposed Rulemaking (2015 NPRM)

1. General

In 2015, the Access Board formally commenced the rulemaking process by issuing a notice of proposed rulemaking to update the existing 508 Standards and 255 Guidelines. See Notice of Proposed Rulemaking; Information and Communication Technology Standards and Guidelines, 80 FR 10879 (proposed Feb. 27, 2015) (hereinafter, NPRM). This proposed rule—while making editorial changes and other updates in response to comments on the 2011 ANPRM— retained the same overall structure and approach to referencing WCAG 2.0.

2. Hearings and Comments

Hearings were held on March 5, 2015 in San Diego, CA, on March 11, 2015 in Washington, DC, and April 29, 2015 in Salt Lake City, UT. Additionally, 137 written comments were received in response to the NPRM. Comments came from industry, Federal and state governments, disability advocacy groups, manufacturers of hardware and software, trade associations and trade organizations, institutions of higher education and research, and individuals who did not identify with any of these groups.

Overall, we received about 160 comments in response to the NPRM, including written comments and oral testimony from witnesses at the three public hearings. These commenters represented, when excluding multiple submissions, about 140 different entities or individuals. By general category, these NPRM commenters can be broken down as follows: individuals (59); disability advocacy organizations (59); ICT companies (10); accessible ICT services providers (11); trade associations representing ITC and telecommunications companies (11); individuals or groups identifying themselves as ICT subject matter experts (13); academicians (6); state or local governmental agencies (7); standards development organizations (3); international disability advocacy organizations (9); and, anonymous (4).

In general, commenters spoke positively about the proposed rule, and noted that it was much improved from earlier iterations in the 2010 and 2011 ANPRMs. By a wide margin, the single most commented-upon aspect of the proposed rule (and the issue on which commenters expressed the greatest unanimity) was timing. Characterizing refresh of the 508 Standards and 255 Guidelines as "long overdue," these commenters urged the Access Board to issue its final rule as expeditiously as possible. On substantive matters, a large number of commenters addressed some aspect of the requirements for electronic content, with the bulk of these comments relating to Section 508-covered content. Another technical area receiving sizeable comment was our proposal that, under both Sections 508 and 255, WCAG 2.0 and PDF/UA-1 serve as the referenced technical standards for accessibility of electronic content, hardware, software, and support documentation and services. Additionally, real-time text (RTT) was a subject of great interest to NPRM commenters, with most commenters representing disability advocacy organizations and academicians supporting the Board's RTT proposal, while ITC manufacturers and trade groups expressed opposition. Further, the issue of harmonization with EN 301 549 received considerable comment. In general, ITC industry-related commenters urged the Board to harmonize more closely with this European specification. Disability advocacy organizations and consumer-related commenters, on the other hand, viewed the proposed rule and EN 301 549 as well harmonized already and expressed concern that further harmonization would be improvident because, in their view, EN 301 549 set forth weaker accessibility requirements in some areas.

Lastly, the Board received multiple comments from individuals or entities addressing various types of electromagnetic sensitivities. These commenters requested that the final rule require accommodations for people with electromagnetic intolerances, so that they might use Federal buildings and Federally-funded facilities. The Board acknowledges the challenges faced by individuals with electromagnetic sensitivities, and notes that electromagnetic sensitivities may be considered a disability under the ADA if the sensitivity so severely impairs the neurological, respiratory, or other functions of an individual that it substantially limits one or more of the individual's major life activities. However, most of the accommodations suggested by these commenters are beyond the scope of this rulemaking or our statutory jurisdiction. Moreover, none of our prior rulemaking notices (i.e., 2010 ANPRM, 2011 ANPRM, and NPRM) proposed technical specifications relating to electromagnetic sensitivities. Thus, were the Board to address electromagnetic sensitivity issues posed by ITC, this complex area would require thorough research and notice-and-comment rulemaking before being addressed through rulemaking.

F. Harmonization with European Activities

1. History

While the Access Board was in the process of updating its existing 508 Standards and 255 Guidelines, a similar process began in Europe to create the first European set of ICT accessibility standards. As a result of the 2005 EU-US Economic Initiative, the Access Board and the European Commission began to work closely on the issue of Information and Communication Technology standards. See, e.g., European Comm., Implementation of the Economic Initiative of the June 2005 EU-US Summit: Joint EU-US Work Programme (Nov. 2005), available at http://trade.ec.europa.eu/doclib/docs/2006/june/tradoc_127643.pdf /h.

In 2005, the European Commission issued Mandate 376, which sought the assistance of several private European standards organizations in the development of European accessibility guidelines for public ICT procurements. See European Comm., M 376 – Standardisation Mandate to CEN, CENELEC, and ETSI in Support of European Accessibility Requirements for Public Procurement of Products and Services in the ICT Domain (Dec. 7, 2005), available at http://www.etsi.org/WebSite/document/aboutETSI/EC_Mandates/m376en.pdf /h. Specifically, Mandate 376 requested that the three European standards setting bodies —European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC) and the European Telecommunications Standards Institute (ETSI) — perform two main tasks: development of a set of functional European accessibility requirements for public procurement of ICT products and services; and creation of an electronic toolkit for use by public procurers.

In early 2014, the three European standardization organizations completed their development process by formally adopting and publishing the first European set of specifications on e-accessibility for public ICT procurements, EN 301 549. See ETSI/CEN/CENELEC, EN 301 549 V1.1.1 (2014-02), Accessibility Requirements Suitable for Public Procurement of ICT Products and Services in Europe (Feb. 2014), available at http://www.etsi.org/deliver/ /h 1 *(#n1)* The functional accessibility requirements specified in EN 301 549 are "closely harmonized" with the then-current draft revisions Section 508 Standards (i.e., the 2011 ANPRM). Accessible ICT Procurement Toolkit – Frequently Asked Questions, Mandate 376, http://mandate376.standards.eu/frequently-asked-questions#difference /h (last accessed Aug. 23, 2016). Unlike the 508 Standards, however, EN 301 549—by its own terms— establishes only non-binding, voluntary accessibility requirements for public ICT procurements. Id.

In October 2016, the European Parliament and Council of the European Union issued Directive 2016/2102, which generally requires EU member states to "ensure that public sector bodies take the necessary measures to make their websites and mobile applications more accessible [to persons with disabilities] by making them perceivable, operable, understandable and robust." Directive 2016/2102 on the Accessibility of the Websites and Mobile Applications of Public Sector Bodies, Article 4 (Oct. 26, 2016), available at http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016L2102&from=EN /h. Directive 2016/2102 further provides that, as a general matter, EN 301 549 V1.1.2 (2015-04) serves as the relevant accessibility standard absent future adoption of technical standards or publication of references to harmonized standards by the European Commission. Id. at Article 6. EN 301 549 is thus now available to government officials in EU member states who may use it as technical specifications or award criteria in public procurements of ICT products and services.

2. Comparison of Final Rule with EN 301 549

In the final rule, the Board has made multiple changes that are similar to EN 301 549. Both the final rule and EN 301 549 address the functions of technology, rather than categories of technologies. Similarly, both offer technical requirements and functional performance criteria for accessible ICT. For example, our use of the phrase "information and communication technology" (ICT) in the final rule, as a replacement of the existing term "electronic and information technology," originates in the common usage of ICT throughout Europe and the rest of the world. Moreover, both documents are organized in similar ways, in that they both have initial scoping and definitions chapters, followed by separate chapters containing technical requirements and functional performance criteria.

Organizationally, the documents differ in several respects. These general differences are outlined in Table 2 below:

Table 2 - Formatting Differences between the Final rule and EN 301 549

Differences	EN 301 549 V1.1.2 (2015-04)	Final Rule
Number of chapters **Note: EN 301 549 breaks out several sections as separate chapters which are combined in the Board's final rule**	13	6
	Chapter 2 – References Chapter 3 – Definitions and Abbreviations	Chapter 1 – Application and Administration
	Chapter 1– Scope Chapter 9 – Web (lists each WCAG 2.0 Level AA success criteria) Chapter 10 – non-Web Documents (lists each success criteria in WCAG 2.0 Level AA using non-Web phrasing as needed. "Empty clause" is used for the four problematic success criteria, to align sub-provision numbering with other chapters.)	Chapter 2 – Scoping Requirements We use incorporation by reference to include the WCAG 2.0 Level AA success criteria For non-Web documents, we are explicit with the word substitution necessary, and provide an exception for the four problematic success criteria
	Chapter 4 – Functional Performance	Chapter 3 – Functional Performance Criteria
	Chapter 5 – Generic requirements (e.g., closed functionality, biometrics, operable parts) Chapter 6 – ICT with two-way voice communications Chapter 7 – ICT with video capabilities Chapter 8 – Hardware	Chapter 4 – Hardware
	Chapter 11 – Software	Chapter 5 – Software
	Chapter 12 – Documentation and support services	Chapter 6 – Support Documentation and Services
Unique chapters	Chapter 13 – ICT providing relay or emergency services	No comparable chapter
	Annex A (informative) – WCAG 2.0	No comparable chapter. We are using incorporation by reference, and not reprinting the entire standard.
	Annex B (informative) – Relationships between requirements and functional performance statements.	No comparable chapter. Similar comparisons are found in the TEITAC Report.
	Annex C (normative) – Determination of compliance	Not within the scope of Section 508 or Section 255, Section 508 compliance is determined by each Federal agency

Differences	EN 301 549 V1.1.2 (2015-04)	Final Rule
	Section 8.3.2 Clear floor or ground space Section 8.3.2.1 Change in level Section 8.3.2.2 Clear floor or ground space	Not within the scope of Section 508 or Section 255 Most similar to "303 Changes in Level" and "305 Clear Floor or Ground Space" from the 2010 ADA Standards for Accessible Design
Differing treatment of similar concepts	Section 6.2 Real-time text (RTT) functionality	412.5 Real-Time Text Functionality is reserved.
	6.5 Video communication	412.7 Video Communication Their 6.5 is a prescriptive standard while our 412.7 is a performance standard

III. Major Issues

A. 508 Standards: Covered Electronic Content

The NPRM delineated specific types of electronic content that Federal agencies would need to make accessible consistent with the technical requirements of the proposed rule. As explained in the NPRM, the Board proposed these provisions to further clarify the requirement in the existing 508 Standards that Federal agencies make electronic information and data accessible to employees and members of the public. NPRM, 80 FR 10880, 10893 (Feb. 27, 2015). The Board noted confusion over what type of content was covered under the broad language of the existing 508 Standards, and the difficulty that Federal agencies displayed in effectively meeting their obligations to provide accessible electronic content. Id.

The NPRM specifically proposed that two discrete groups of content be covered by the refresh of the 508 Standards. First, in proposed E205.2, the Board proposed that all public-facing content comply with applicable technical requirements for accessibility. Public-facing content refers to electronic information and data that a Federal agency makes available directly to the general public. NPRM, 80 FR at 10893. The requirement to make accessible public-facing content is discussed below in Section IV.B. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 2: Scoping Requirements – E205.4) of this preamble. Second, in proposed E205.3, the Board proposed that non-public-facing electronic content covered by the 508 Standards be limited to the following eight categories of official agency communications: (1) emergency notifications; (2) initial or final decisions adjudicating an administrative claim or proceeding; (3) internal or external program or policy announcements; (4) notices of benefits, program eligibility, employment opportunity, or personnel action; (5) formal acknowledgements of receipt; (6) survey questionnaires; (7) templates and forms; and (8) educational and training materials.

We sought comment in the NPRM on whether the proposed eight categories of non-public-facing content were sufficiently clear, and whether they provided sufficient accessibility without unnecessarily burdening agencies. Id. at 10894. The Board further requested comment on whether a ninth category for "widely disseminated" electronic content should be included in the final rule. Id.

Nine commenters responded to the proposed provision regarding non-public-facing electronic content (proposed E205.3). Commenters included two Federal agencies, one state/local agency, one disability advocacy organization, one accessible ICT services provider, two ICT subject matter experts, and two individuals.

In general, commenters agreed with the proposed approach requiring that only certain categories of non-public-facing content be made accessible, and most commenters found the categories to be sufficiently clear. One commenter, a state/local agency, objected to the Access Board's statement in the preamble of the NPRM that only "final electronic documents that are ready for distribution" would be subject to accessibility requirements under proposed E205.3, and indicated that documents in all stages of preparation should be covered. NPRM, 80 FR at 10894. Another commenter, an ICT subject matter expert, requested clarification of the internal and external program and policy announcements category and suggested including an additional category for announcements sent to all employees. An accessible ICT services provider was the only commenter to object to the eight categories, finding them too confusing and too difficult to implement. That commenter preferred that the requirement for accessibility of non-public-facing content be tied to the extent of the content's distribution, and suggested that any document distributed to 50 or more individuals be made accessible.

Three other commenters responded to the NPRM's question five as to whether a "widely disseminated" category should be added. Id. at 10895. One Federal agency opposed inclusion of this category, asserting that it would cause confusion. One ICT subject matter expert and one Federal agency generally liked the idea of such a category, but acknowledged that definitional challenges would make it difficult to implement.

The Federal agency supporting inclusion of the "widely disseminated" category indicated that the eight proposed categories would not sufficiently encompass the internal Web pages available to employees, and suggested that the problem could be solved with the addition of a ninth category for internal Web pages. This commenter asserted that without such a category for internal Web pages, agencies would need to develop systems to categorize internal Web page content, ensure that employees with disabilities could navigate to the covered content, and find a way to create an integrated accessible experience across internal Web sites where some content is accessible and some is not.

Upon careful consideration of the comments, we have decided to retain the proposed eight categories in the final rule and have added a ninth category for intranet content, as described below. Most commenters concurred with the proposed approach providing categories for non-public-facing content, and indicated that the categories were clearly described. The Board, therefore, finds no reason to alter the eight proposed categories, and has retained them, as proposed, in the final rule. However, the Board did not intend for the use of these categories to exclude some intranet content; all intranet content is currently covered under the existing 508 Standards. 36 CFR §1194.22 (providing technical requirements for "[W]eb-based intranet … information and applications"). Therefore, in the final rule, the Board has added a ninth category to final E205.3, requiring that "intranet content designed as a Web page" also conform to accessibility requirements to ensure that the final rule does not inadvertently result in a reduction in accessible intranet content. The Board agrees with commenters that a "widely disseminated" standard would be difficult to define and implement in a consistent manner across agencies, and would likely cause confusion. The Board thus declines to add such a category to the final rule.

B. Application of WCAG 2.0 to Non-Web ICT

The NPRM proposed to apply WCAG 2.0 equally to both Web and non-Web documents and software. NPRM, 80 FR at 10880. A discussion of the scoping of these requirements under the Revised 508 Standards and 255 Guidelines can be found below in Section IV.B (Summary of Comments and Responses on Other Aspects of the Proposed Rule –508 Chapter 2: Scoping Requirements) and Section IV.D (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 255 Chapter 2: Scoping Requirements). In the NPRM preamble, we explained that applying WCAG 2.0 "outside the Web browser environment not only ensures greater accessibility for persons with disabilities, but also minimizes the incremental burden on regulated entities by simplifying compliance through incorporation of a technologically neutral consensus standard." Id. at 10895.

Since the establishment of the TEITAC Advisory Committee, the general consensus has been that the success criteria in WCAG 2.0 provided sufficient requirements to address the accessibility of non-Web documents and non-Web software applications. Id. In the TEITAC Report and the 2010 ANPRM, the Board restated and recast each WCAG 2.0 success criterion using phrasing appropriate for non-Web documents and software. 2010 ANPRM, 75 FR at 13457.

In response to concerns raised by commenters, in the 2011 ANPRM the Board proposed to incorporate by reference WCAG 2.0 and proposed a direct reference to WCAG 2.0 for non-Web content and software, instead of rewriting each criterion. 2011 ANPRM, 76 FR at 76640. This approach stimulated the formation of an industry ad hoc working group aimed at determining the practicality of using WCAG 2.0 for this purpose. This working group analyzed each WCAG 2.0 Success Criterion to determine its suitability for application to non-Web documents and software. W3C® Web Accessibility Initiative, W3C® Working Group Note – Guidance on Applying WCAG 2.0 to Non-Web Information and Communications Technologies (Sept. 5, 2013), https://www.w3.org/TR/wcag2ict/.

The working group determined that of the 38 Level A and Level AA Success Criteria in WCAG 2.0, 26 do not include Web-related terminology that would cause the reader to question whether they are applicable to non-Web documents and non-Web software. Id. Therefore, these Success Criteria can be applied directly as written to non-Web documents and software. Of the remaining 12 Success Criteria, the working group found that 8 could be applied as written if certain Web-specific terms or phrases, e.g., "Web page" are replaced with non-Web-specific terms or phrases, e.g., "non-Web documents" and "non-Web software." Id. The remaining four Success Criteria posed problems in being applied to non-Web content because they refer to "sets of Web pages." Id. Applying these four criterion to non-Web documents and software would require interpretation that could inadvertently change the meaning of the requirements. Id. In their report, the working group concluded that circumstances in which those four Success Criteria could be applied outside the context of Web content would be "extremely rare." Id.

Relying on the working group's findings, in the NPRM the Board proposed to directly apply WCAG 2.0 to all non-Web documents and software. NPRM, 80 FR at 10895. Sixteen commenters responded to the proposal of applying WCAG 2.0 to non-Web content. Six commenters (five ICT companies and trade associations, and an ICT subject matter expert) strongly advocated for returning to the previous approach of reprinting three variants of WCAG 2.0 in the 508 Standards and rewriting the requirements with non-Web specific terminology. These commenters asserted that agencies would not be able to consistently apply the WCAG 2.0 success criteria to non-Web documents without separate chapters. They were also concerned that by incorporating WCAG 2.0 by reference, conformity assessment would become a single check-off item in that agencies would not ensure compliance with each success criteria unless they were specifically laid out in the regulatory text. Ten commenters (four

disability advocacy organizations, three academics, two individuals, and one ICT company) generally supported applying WCAG 2.0 to non-Web content. One of these commenters explained that referencing WCAG 2.0 as a whole is not problematic because as a single standard, one must comply with all of the provisions to comply with the standard. This commenter explained that there is much overlap between Web and non-Web content, for example an eBook is a document that also has Web components, software, and media. This incorporation of WCAG 2.0 for non-Web content as well as Web content allows the user to evaluate all content with one standard.

Based on the comments received and the findings of the working group, we have decided that agencies are better served by 508 Standards that incorporate WCAG 2.0 by reference than they would be if the final rule were to contain three different versions of WCAG 2.0 for Web content, non-Web documents, and non-Web software. The value of a single standard cannot be underestimated. We attempted to restate the WCAG 2.0 criteria in the 2010 ANPRM, and the approach was widely criticized by commenters. Therefore, in the final rule we retain the approach proposed in the NPRM of incorporating by reference WCAG 2.0 for non-Web documents and non-Web software.

To address concerns expressed by some commenters and the working group regarding the application of a few WCAG 2.0 Success Criteria to non-Web documents and non-Web software, in the final rule we have excepted non-Web documents and non-Web software from compliance with these criteria. Specifically, non-Web documents and non-Web software need not comply with WCAG 2.0 Success Criteria 2.4.1 Bypass Blocks, 2.4.5 Multiple Ways, 3.2.3 Consistent Navigation, and 3.2.4 Consistent Identification. Additionally, we added new provisions to instruct the reader when applying WCAG 2.0 to non-Web documents and non-Web software to replace the term "Web page" with the term "document" or "software." We added this exception and new provisions where applicable throughout the final rule text. (E205.4, E205.2.1, E207.2, E207.2.1, C203.1, C203.2.1, C205.2, 501.1, 504.2, 504.3, 504.4, and 602.3).

C. Incorporation by Reference of PDF/UA-1

The NPRM proposed to incorporate by reference (IBR) PDF/UA-1 and allow compliance with this standard as an alternative to compliance with WCAG 2.0. This proposal was in response to commenters to the 2010 and 2011 ANPRMs that asserted that PDF/UA-1 was an international accessibility standard intended for developers using PDF writing and processing software. These commenters asserted that the use of PDF/UA-1 would provide definitive terms and requirements for accessibility in PDF documents and applications that generate PDFs. The Board was persuaded by these comments and proposed to incorporate PDF/UA-1 by reference in the NPRM (proposed E102.6 and C102.6). The Board included it as an alternative to compliance with WCAG 2.0 for electronic content and support documentation for both the 508 Standards and the 255 Guidelines (proposed E205.4, C203.1, and 602.3). By including alternative compliance with PDF/UA-1, the Board intended to give agencies flexibility in meeting accessibility requirements for PDFs. This approach assumed that PDF/UA-1 was fully sufficient to meet the accessibility requirements of PDF users with disabilities.

Ten commenters addressed the proposal to allow conformance with PDF/UA-1 as an alternative to WCAG 2.0. Three commenters, two ICT companies and one accessible ICT services provider, explained that the PDF/UA-1 standard has limitations and does not include requirements for contrast, embedded videos, captioning, or other related requirements for the accessibility of multimedia. These commenters recommended requiring conformance with provisions of WCAG 2.0 in addition to compliance with PDF/UA-1, to ensure that PDF documents are fully accessible. Four commenters (one Federal agency and three ICT companies and trade associations) also noted the shortcomings of PDF/UA-1 as an alternative to WCAG 2.0 conformance and recommended removing the proposed alternative from the final rule. These commenters recommended that the Board instead indicate in an advisory that use of PDF/UA-1 is a method of achieving conformance to WCAG 2.0. The Federal agency commenter explained that the PDF/UA-1 standard is copyrighted, expensive, and the format is not easy for subject matter experts to work with. Additionally, this commenter explained that the WCAG 2.0 guidelines are sufficient to communicate accessibility conformance. The remaining commenters (two individuals and a disability advocacy organization) recommended clarification of the application of the proposed standard to non-Web documents and asserted a preference for requiring HTML documents instead of accessible PDFs, noting that accessible PDFs are not as useful as HTML documents.

The Board is persuaded by the majority of commenters that PDF/UA-1 should not serve as a referenced accessibility standard for electronic content and support documentation in the final rule. The intent of the proposed IBR of PDF/UA-1 in the NPRM was to make conformance assessment of PDF documents easier, assuming that, in the future, PDF/UA-1 would become widely adopted. WCAG 2.0 strongly informed the development of PDF/UA-1. With the exception of the contrast requirement, PDF/UA-1 includes most accessibility requirements relevant to the PDF format, including textual equivalence for static graphical elements. However, PDF/UA-1 does not address scripting or the use of PDF files as a container for video. Therefore, the end user would still have to reference WCAG 2.0 for some requirements to ensure that a PDF file is fully accessible. Because WCAG 2.0 can be used as a sole standard for PDF compliance, and PDF/UA-1 cannot, the Board finds WCAG 2.0 to be appropriate as the sole standard for PDF files. Therefore, in the final rule, we have removed the reference to PDF/UA-1 from E205.4, C203.1, and 602.3. It is important to note, however, that even without this reference, PDF/UA-1 can still be useful to agencies conducting assessments of PDF files to ensure WCAG 2.0 conformance.

Although we have decided not to include PDF/UA-1 in the final rule as an alternate conformance standard for PDF, we have determined that PDF/UA-1 remains an appropriate standard for authoring tools. Therefore, in the final rule, we added a new provision expressly specifying that authoring tools capable of exporting PDF files must conform to PDF 1.7 (the current standard for PDF, also referred to as ISO 32000-1) and be

capable of exporting PDF files that conform to PDF/UA-1 (final 504.2.2). This provision is discussed in more detail in Section IV. (Summary of Comments and Responses on Other Aspects of the Proposed Rule).

D. Real-Time Text

The NPRM proposed to require that ICT providing real-time voice communication support real-time text (RTT) functionality and ensure the compatibility of multiline displays and features capable of text generation. (proposed 410.6). More importantly, the NPRM sought to ensure the interoperability of RTT across platforms. To accomplish this goal, the NPRM proposed to incorporate by reference specific standards for RTT interoperability in certain environments typically used in the United States (proposed E102.5, E102.8.1, C102.5, and C102.8.1). The NPRM proposed that when ICT interoperates with Voice over Internet Protocol (VoIP) products or systems using Session Initiation Protocol (SIP), the transmission of RTT must conform to the Internet Engineering Task Force's RFC 4103 standard for RTP Payload for Text Conversation. Where ICT interoperates with the Public Switched Telephone Network (PSTN), RTT would be required to conform to the Telecommunications Industry Association's TIA 825-A standard for TTY signals at the PSTN interface (also known as Baudot).

In developing the proposed rule, the Board took note of the approach to RTT in the EN 301 549 Standard. Section 6.2 of EN 301 549, entitled "Real-time text (RTT) functionality," addresses ICT with two-way voice communication. Section 6.2.3, entitled "Interoperability," lists five different standards for RTT operating in three different environments: the publicly switched telephone network; VoIP using SIP; and other ICT using RTT conforming to the IP Multimedia Sub-System (IMS) set of protocols specified in section 6.2.3(c). A sixth standard was proposed in section 6.2.3(d) for ICT operating in an unspecified environment, specifically that ICT is permitted to interoperate with "a relevant and applicable common specification for RTT exchange that is published and available."

In the preamble to the NPRM, we asked nine questions about text-based communications and the different standards the Board was considering incorporating. NPRM, 80 FR at 10880, questions 1–2, 8–13 and 36. Seven of the questions addressed RTT functionality and standards, and two of the questions sought information on costs. Seventeen commenters responded to the topic of RTT. While most of these commenters acknowledged the importance of RTT as a replacement for outdated Text Telephone (TTY) technology, there was minor disagreement from industry trade associations about whether RTT technology was sufficiently mature for deployment to replace TTYs. Most commenters from industry, academia, and disability rights organizations agreed that RTT could be deployed, but disagreed about which standard to use for RTT operating in different systems. ICT manufacturers and ICT industry associations urged the Board not to adopt any specific standard for RTT, requesting that the final rule leave open the ability to use some future technology that may provide better functionality than existing environments. In response to the Board's questions in the NPRM, several commenters supported broad deployment of RTT at all times, both in the Federal sector and in the private marketplace; however, one ICT industry commenter questioned the need or demand for the technology. In response to our questions on cost, commenters from the ICT industry stated that RTT would not be cost-effective and would limit manufacturers flexibility. On the other hand, commenters from academia, research entities, and disability rights organizations described the benefits resulting from the implementation of RTT and the inherent cost savings in decreased use of relay services mandated under the ADA.

In April 2016, during the pendency of the Access Board's ICT rulemaking, the Federal Communications Commission (FCC) published a Notice of Proposed Rulemaking (FCC NPRM) seeking comment on proposals to replace the FCC rules requiring support for TTY technology with rules requiring support for RTT technology. See Transition from TTY to Real-Time Text Technology; Proposed Rule, 81 FR 33170 (proposed May 25, 2016); see also FCC, Transition from TTY to Real-Time Text Technology; Petition for Rulemaking to Update the Commission's Rules for Access to Support the Transition from TTY to Real-Time Text Technology, and Petition for Waiver of Rules Requiring Support of TTY Technology, Notice of Proposed Rulemaking, CG Docket No. 16-145, GN Docket No. 15-178, FCC 16-53 (released Apr. 29, 2016), available at https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-53A1.pdf *(https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-53A1.pdf)*. As discussed above in Section I.A. (Executive Summary – Purpose and Legal Authority), the FCC is responsible for enforcing Section 255 and issuing implementing regulations; it is not bound to adopt the Access Board's guidelines as its own or to use them as minimum requirements. As the FCC had issued a notice of its intent to regulate in this area, the Board determined that it would reserve the issue of RTT in the final rule to be addressed in a future rulemaking.

In December 2016, shortly before publication of this final rule, the FCC issued a report and order establishing rules to facilitate telecommunication service providers' transition from TTY to RTT. See FCC, Report and Order and Further Notice of Proposed Rulemaking, CG Docket No. 16-145; GN Docket No. 15-178, FCC 16-169 (released Dec. 16, 2016) (hereafter, "FCC RTT Order"), available at https://www.fcc.gov/document/adoption-real-time-text-rtt-rules *(https://www.fcc.gov/document/adoption-real-time-text-rtt-rules)*. The FCC RTT Order establishes, among other things, requirements that: facilitate telecommunications service providers' transition from TTY technology to RTT technology that permits simultaneous voice and text on the same call using the same device; achieve interoperability adhering to RFC 4103 as a safe harbor standard; provide backwards compatibility with TTYs for a specified period; and support RTT transmissions to 911 call centers and telecommunications relay centers. Id. The FCC RTT Order also incorporates a notice seeking input on the integration of these services into telecommunications relay services, and on the possible addition of RTT features for people with cognitive disabilities and people who are deaf-blind. Id. The Access Board continues to monitor these proceedings and will update the 508 Standards and 255 Guidelines as appropriate.

E. Functional Performance Criteria

1. Limited Vision and Limited Hearing

The NPRM proposed to revise the existing functional performance criteria (FPC) for users with limited vision. The NPRM proposed that where technology provides a visual mode of operation, it must provide one mode of operation that magnifies, one mode that reduces the field of vision, and one mode that allows user control of contrast. As explained in the NPRM, the proposed FPC for limited vision was a significant departure from the FPC for limited vision in the existing 508 Standards and 255 Guidelines, which focused on accommodating a specific visual acuity.2 *(#n2)* NPRM, 80 FR 10880, 10898 (Feb. 27, 2015).

In proposed 302.2, the Board replaced the visual acuity thresholds with requirements for magnification, reduction of field of vision, and user control of contrast to provide criteria that would address a range of limited vision disabilities. NPRM, 80 FR at 10898 (noting that commenters to the 2010 and 2011 ANPRMs recommended that the FPC include features that would address accessibility for users with limited vision). The Board took a similar approach to the FPC for limited hearing (proposed 302.5), proposing that where technology provides an auditory mode of operation, it must provide at least one mode that improves clarity, one mode that reduces background noise, and one mode that allows user control of volume. Id. at 10944.

We sought comment in the NPRM with respect to the proposed FPC for limited vision. Id. at 10913. In question 17 the Board asked whether the requirements for magnification, reduction of field of vision, and user control of contrast should be more specific. Id. The Board further requested that commenters provide a scientific basis for any recommended thresholds. Id. The Board received 11 comments on the proposed FPC for limited vision (proposed 302.2), including comments from three ICT companies, three ICT trade associations, an accessible ICT services provider, a state/local government, an ICT subject matter expert, an individual, and a coalition of disability rights organizations.

The individual commenter and the ICT subject matter expert generally concurred with proposed 302.2, but did suggest possible improvements. The individual commenter suggested adding a "control of color" criteria so that users could choose a black background with white text. The ICT subject matter expert asserted that the Board should include specific thresholds for the criteria, but did not provide suggestions for specific thresholds supported by research or data. The state/local government indicated that the proposed FPC did not adequately address the needs of people with limited vision, but did not offer specific suggestions for improving the provision.

The coalition of disability rights organizations appreciated the Board's effort with respect to the limited vision FPC, but felt that the proposed provision missed the mark. The group pointed out that the proposed provision assumed a lack of accessibility, and without a baseline, could result in unnecessary magnification of content that is already sufficiently large, or reduction of a field of vision that is already sufficiently small for limited vision users. The group suggested that the Board alter the provision to require one mode readable by a user with 20/40 vision acuity, one mode that is usable with a 10-degree field of vision, and one mode that provides high contrast.

The ICT companies and trade associations asserted that the proposed FPC for limited vision was too prescriptive, and was inconsistent with the level of specificity contained in the proposed FPCs for other disabilities. These commenters further noted that the FPC for limited vision imposed criteria not required by the technical requirements. In addition, the ICT companies expressed concern that mandating specific criteria in the FPC would stifle innovation. One ICT company described how certain products could provide accessibility for people with limited vision without meeting the proposed criteria. Some industry commenters noted that the proposed limited vision FPC was not technology-neutral and pointed to EN 301 549 as a more useful model. These industry commenters noted that EN 301 549 allows manufacturers the flexibility to include the limited vision accessibility features that are most applicable to a particular type of technology. EN 301 549 clause 4.2.2. ICT industry commenters further noted the benefits to manufacturers of harmonizing with international standards.

Upon consideration of the comments regarding proposed 302.2, the Board agrees that the proposed language of the limited vision FPC is too prescriptive and risks ineffective implementation in the absence of specific baselines for the proposed criteria. The Board is persuaded that the technology-neutral approach advanced throughout this refresh of the 508 Standards and 255 Guidelines is equally appropriate with respect to the FPC. The Board thus finds that harmonization with the language of EN 301 549 is a reasonable approach to the limited vision FPC, and adopts this suggestion for the language of 302.2 in the final rule. Therefore, we have revised final 302.2 to require ICT that provides a visual mode of operation also provide "at least one visual mode of operation that enables users to make better use of their limited vision."

The proposed rule included a proposed FPC for limited hearing that closely mirrored the structure of the proposed limited vision FPC. In proposed 302.5, the Board proposed a limited hearing FPC that would have required ICT that provides an auditory mode of operation to also provide at least one mode of operation that improves clarity, one mode that reduces background noise, and one mode that allows user control of volume. ICT industry commenters, and a coalition of disability rights organizations, responded with the same issues that they presented with respect to the proposed limited vision FPC. Specifically, they posited that the proposed limited hearing FPC would not necessarily provide a better functional experience for users with limited hearing. An accessible ICT services provider, as well as an ICT trade association and two ICT companies, noted that the requirements for reduction of background noise and improvement of clarity would be difficult to define, measure, and achieve. As with the proposed FPC for limited vision, ICT industry commenters indicated that harmonization with the language of EN 301

549 would be technology-neutral and would give manufacturers the flexibility to develop accessibility features appropriate for their specific technology. EN 301 549 clause 4.2.5.

Upon consideration of the comments, and in the interest of creating a consistent regulatory structure with respect to all of the FPC in the final rule, the Board agrees that harmonization with the international standard is appropriate for the limited hearing FPC. Therefore, in the final rule, we have revised 302.5 to require that where ICT has an audible mode of operation, it must include "at least one mode of operation that enables users to make use of limited hearing."

2. Limited Cognitive Abilities

The existing 255 Guidelines contain a FPC that expressly addresses operability of ICT by persons with cognitive, language, and learning disabilities. 36 CFR §1993.41(i) (requiring that ICT operate in "at least one mode that minimizes the cognitive, memory, language, and learning skills required of the user."). The existing 508 Standards do not include a comparable provision. 36 CFR §1194.31 (listing six FPC, none of which address limited cognition). During its review, the TEITAC Advisory Committee recommended eliminating this requirement citing a lack of common standards or testable metrics. NPRM, 80 FR at 10910. The TEITAC Advisory Committee suggested that the Board eliminate the limited cognition FPC until more research could be done. Id. The Board thus did not include the provision in the 2010 and 2011 ANPRMs. Id. After considering comments received in response to the ANPRMs, the Board concurred that more research was needed before it could propose a meaningful FPC for limited cognitive ability. Id. Therefore, in the NPRM, we did not propose to include an FPC for limited cognition in the Revised 508 Standards or Revised 255 Guidelines. Id.

A total of 11 commenters addressed the NPRM's failure to include provisions specifically addressing ICT operability by persons with cognitive, language, or learning disabilities. These commenters included four individuals who identified themselves as either having a learning or cognitive disability, or having a family member with a learning or cognitive disability, one accessibility ICT services provider, one ICT subject matter expert, four disability advocacy organizations, and a coalition of disability rights organizations.

The overarching sentiment that the commenters expressed was that the proposed rule marginalized cognitive, language, and learning disabilities. Disability advocacy organizations, as well as individual commenters, provided general background information on the incidence of cognitive, language, and learning disabilities in the United States. They noted the significant portion of the United States population that is affected by a cognitive disability, and further noted that the incidence of cognitive disability in the United States is growing as the population ages. Individual commenters described challenges using ICT that they or their family members face as a result of their cognitive disabilities.

Five commenters (including disability advocacy organizations, an ICT subject matter expert, an accessible ICT services provider, and a coalition of disability rights organizations) criticized the Board for not including an FPC expressly directed to the needs of individuals with cognitive or learning disabilities. These commenters urged inclusion of a new provision in the final rule similar to § 1193.41(i) of the existing 255 Guidelines. Some of these commenters noted that while the Access Board's proposed revision of the 508 Standards and 255 Guidelines was silent on cognitive accessibility, the European ICT accessibility standard, EN 301 549, addresses cognitive accessibility and provides adjustable timing, error indication and suggestion, and logical focus order as examples of relevant design features for people with cognitive disabilities. EN 301 549 clause 4.2.10.

One individual commenter suggested that the Board rewrite proposed Chapter 3 to model all FPC on the underlying accessibility principles of WCAG 2.0. W3C®, An Introduction to Understanding WCAG 2.0, (Mar. 17, 2016), https://www.w3.org/TR/UNDERSTANDING-WCAG20/intro.html /h The commenter suggested that by eliminating references to specific disabilities, the FPC should equally address all disabilities, including cognitive disabilities.

After careful consideration of the comments, we are persuaded that the final rule should include an FPC for limited cognitive abilities. In light of the significant portion of the United States population that has cognitive, language, or learning disabilities, the Board finds that it would be inappropriate to exclude the needs of this population from the Revised 508 Standards and 255 Guidelines. U.S. Census, Sex By Age By Cognitive Difficulty, 2010-2014 American Community Survey 5-Year Estimates, http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_B18104&prodType=table *(http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=ACS_14_5YR_B18104&prodType=table)* (last visited on Aug. 8, 2016) (estimating that in 2014 almost 5 percent of the civilian non-institutionalized U.S. population 5 years old and older had a cognitive disability). The existing 255 Guidelines contain an FPC for limited cognition. While evaluation of accessibility under this existing provision has posed some challenges, the Board nonetheless concludes that, given the significant population of Americans with limited cognitive, language, or learning abilities, it is important and appropriate to include an FPC addressing their accessibility needs in Chapter 3—which applies under both the Revised 508 Standards and 255 Guidelines. Moreover, in an effort to maintain a consistent regulatory structure for the FPC in the final rule, the language for this FPC in the final rule seeks to harmonize with the FPC for limited cognition in EN 301 549. Therefore, in the final rule, we have added a new section 302.9, which requires that ICT provide "features making its use by individuals with limited cognitive, language, and learning abilities simpler and easier."

IV. Summary of Comments and Responses on Other Aspects of the Proposed Rule

Overall, we received 162 comments in response to the NPRM, including written comments submitted to the online docket (https://www.regulations.gov/docket?D=ATBCB-2015-0002 *(https://www.regulations.gov/docket?D=ATBCB-2015-0002)*) and oral statements at three public hearings. In addition to comments received on the major issues discussed in the preceding section, commenters also expressed views on a variety of other matters related to the proposed rule. The Access Board's response to significant comments on these other matters are discussed below on a chapter-by-chapter basis following the organization of the final rule. Also addressed below are requirements in the final rule that have been substantively revised from the proposed rule. Provisions in the final rule that neither received significant comment nor materially changed from the proposed rule are not discussed in this preamble.

A. 508 Chapter 1: Application and Administration

Chapter 1 of the Revised 508 Standards contains a general section that defines equivalent facilitation, addresses application of referenced standards, and provides definitions of terms used in the Standards. In the final rule, the provisions expressly incorporating the ten referenced standards into the Revised 508 Standards have been relocated from proposed E102 to a new Chapter 7, which provides a centralized IBR section pursuant to regulations issued by the Office of the Federal Register (OFR) that govern incorporations by reference in the Federal Register. This reorganization of IBR provisions is discussed at greater length in Section IV.I (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 7: Referenced Standards). We have also made minor changes to 508 Chapter 1 in response to comments to improve clarity, accuracy, and ease of use. These changes are described below.

E101.3 Conventional Industry Tolerances

The NPRM proposed this section in the interests of being explicit about dimensions. We did not receive any comments on this provision but have decided, for the purpose of clarity and consistency with the Board's other rulemakings, to add "with specific minimum or maximum end points" to E101.3 in the final rule.

E102 Referenced Standards

This section has been significantly reorganized and revised in the final rule. The general statements in the first two sentences regarding the application of referenced standards remain essentially unchanged from the proposed rule. However, the subsequent provisions in the proposed rule that expressly IBR the ten referenced standards into the Revised 508 Standards (i.e., proposed E102.2 – E102.10) have been moved in the final rule to a centralized IBR section – new Chapter 7. This reorganization of IBR provisions was made to comply with OFR regulations that govern incorporations by reference. See 1 CFR part 51. Comments related to proposed incorporations by reference into the Revised 508 Standards are discussed below in Section IV.I (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 7: Referenced Standards).

E103.4 Defined Terms

We identified seven comments regarding proposed E103.4. These commenters asked the Board to clarify the definitions of (or provide examples for) the following terms: "authoring tool," "application," "document," "operable part," "platform software," "public facing," and "software." Two commenters, an ICT company and an industry trade association requested the Access Board to fully align the definition of "authoring tool" to the definition in EN 301 549.

After review of the comments, we have determined that we would be providing clearer information by including more terms, and we therefore added definitions for "document," "non-Web document," "non-Web software," and "Web page" to the list of defined terms in E103.4 in the final rule. The definitions provided for these terms closely track the definitions used in WCAG 2.0 and EN 301 549. For similar reasons of completeness, we also added the terms "software tools" and "variable message signs." Additionally, based on commenter concerns, we amended the definitions of "software" and "operable part" in the final rule. The definition of "software" clarifies the term by giving the examples of applications, non-Web software, and platform software. The definition of "operable part" now makes clear that the term applies to physical parts (hardware). Finally, the Board added definitions for "alteration" and "existing ICT," which are new terms used in the safe harbor provision applicable to existing 508-covered ICT (E202.2). Additional discussion of these new terms appears below in section IV.C (508 Chapter 2: Scoping Requirements in the discussion of the safe harbor provision at E202.2).

In response to the requests to align the definition for "authoring tool" to EN 301 549, the Board regards the two definitions as being equivalent, but has decided to retain the definition from the proposed rule due to editorial consideration. The main difference between the approach taken

in the proposed rule and that of EN 301 549 is that the EN 301 549 definition for "authoring tools" includes three notes containing advisory guidance. Our practice is to provide advisory guidance in supplemental materials.

B. 508 Chapter 2: Scoping Requirements

508 Chapter 2 addresses application and scoping of the Revised 508 Standards, including exceptions. We have made multiple significant changes to this chapter. We added a ninth category to E205.3, official agency communications that are non-public-facing electronic covered content, and clarified the application of WCAG 2.0 to non-Web documents and software. We made corresponding changes to E205.4 and E207.2, including adding E205.4.1 and E207.3, which specify the word substitution necessary to apply WCAG 2.0 to non-Web content. These changes are discussed above in Section III.B. (Major Issues – Application of WCAG 2.0 to Non-Web ICT). In addition, we made editorial changes for consistency and clarity. These editorial changes and the responses to other comments received are discussed below.

E202 General Exceptions

In response to some agencies' concerns regarding the time and resources that might be needed to remediate existing (legacy) ICT, the Board has incorporated a "safe harbor" provision into the Revised 508 Standards (E202.2). Under this provision, legacy ICT that complies with the existing 508 Standards and has not been altered after the compliance date (i.e., one year after publication of the final rule) need not be modified or upgraded to conform to the Revised 508 Standards. However, when existing ICT is altered after the compliance, such alterations must comply with the Revised 508 Standards. Application of the safe harbor provision will allow Federal agencies to focus their ICT accessibility efforts primarily on new ICT.

This safe harbor provision applies on an "element-by-element" basis in that each component or portion of existing ICT is assessed separately. In specifying "components or portions" of existing ICT, the safe harbor provision independently exempts those aspects of ICT that comply with the existing 508 Standards from mandatory upgrade or modification after the final rule takes effect. This means, for example, that if two paragraphs of text are changed on an agency Web page, only the altered paragraphs are required to comply with the Revised 508 Standards; the rest of the Web page can remain "as is" so long as otherwise compliant with the existing 508 Standards.

Additionally, to further clarify the specific circumstances under which existing ICT must be made to comply with the Revised 508 Standards, the Board has added definitions for "alteration" and "existing ICT" in E103.4. "Existing ICT" is defined as ICT that has been procured, maintained or used on or before the compliance date (which is one year after publication of the final rule). The Access Board has intentionally omitted the term "developed" from this definition because existing ICT that has been developed – but not yet used or procured – still presents an opportunity to incorporate requisite accessibility.

"Alteration," in turn, is defined as a change to existing ICT that affects interoperability, the user interface, or access to information or data. In defining "alteration," the Board seeks to distinguish between changes to existing (compliant) ICT that trigger compliance obligations under the Revised 508 Standards, and those that do not. For example, since correction of a typographical error on a Web page does not affect interoperability, user interface, or access to information and data, this type of change would not trigger compliance obligations under the Revised 508 Standards. However, changing the footer portion of an agency Web site through a content management system (CMS) would affect access to information and data (i.e., the information in the footer). In that case, changes to the footer would need to conform to the Revised 508 Standards; however, other page content that was not affected by the footer revision would not need to be upgraded or modified. In another example, a typical software security patch does not affect interoperability, user interface, or access to information and data; therefore, deployment of such software security patches would not be considered "alterations" under the safe harbor provision.

The safe harbor provision is applicable only to existing ICT covered by Section 508, and does not extend to Section 255-covered telecommunications equipment or CPE. Because the FCC has exclusive authority to implement and enforce Section 255, compliance with the Revised 255 Guidelines is not required until they are adopted by the FCC through a separate rulemaking. As such, application of the revised guidelines to existing ICT covered by Section 255 also lies within the province of the Commission.

Agencies and the public may need to refer to the existing 508 Standards to determine whether existing ICT complies with its accessibility requirements once the final rule takes effect. To that end, the existing 508 Standards have been republished as an appendix (Appendix D) to part 1194 for reference when evaluating legacy ICT under the safe harbor provision. In Appendix D, while the text and structure of each provision remains the same as in the existing 508 Standards, the numbering convention for each provision has been modified to comply with publication requirements for matter located in regulatory appendices.

The NPRM proposed five other general exceptions that apply to ICT that: is an integral part of a national security system (proposed E202.2); is acquired by a contractor incidental to a contract (proposed E202.3); is located in maintenance spaces (proposed E202.4); would require a fundamental alteration to be accessible (E204.5); or, is not commercially available (proposed E202.6). These five exceptions closely parallel equivalent requirements in existing 508 Standards (36 CFR §§1194.3(a), 1194.3(b), 1194.3(f), 1194.3(e), and 1194.2(b), respectively).

We received six comments expressing concern or requesting changes to proposed E202. Two commenters (a disability advocacy organization and an ICT subject matter expert) requested deletion of proposed E202.2, which exempts national security systems as defined by 40 U.S.C 1103(a). These commenters asserted that ICT that is part of a National Security System should be required to conform to the maximum extent possible, instead of being exempted entirely from compliance. Two commenters (a disability advocacy organization and an ICT subject matter expert) also requested that the exception for ICT acquired incidental to a contract in proposed E202.3 be removed, asserting it would discourage contractors from hiring employees with disabilities. Additionally, an individual commented that proposed E202.3 needed a major change because it has not been successful in the past in getting software manufacturers to make accessible software. This individual requested that the final rule require refunds if a future version of software failed to meet accessibility requirements. The Board also received three comments (one ICT company and two industry trade associations) seeking expansion of proposed E202.4, which exempts certain functions of ICT located in maintenance or monitoring spaces, to include a "back office exemption" for maintenance functions and maintenance spaces.

After carefully considering the comments received, we have decided not to make any changes to these five general exceptions in proposed E202, except to shift the numbering of the provisions to accommodate the incorporation of a safe harbor provision at E202.2 that applies to legacy 508-covered ICT. The exception proposed for National Security Systems (final E202.3) is taken directly from the statute authorizing the 508 Standards (Section 508 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. 794d). Additionally, the statutory definition of "information technology," which excludes equipment that is acquired by a Federal contractor incidental to a contract, prohibits the Access Board from requiring such ICT to comply with the Revised 508 Standards and 255 Guidelines. 40 U.S.C. 11101(6), stating that "[t]he term 'information technology' … does not include any equipment acquired by a Federal contractor incidental to a Federal contract."

E202.4 in the proposed rule (final E202.5) was a change to existing 508 Standards §1194.3(f) in that the exception was narrowed to apply only to those status indicators and operable parts that are available from maintenance spaces. Since it is the usual case that rack-mounted equipment is operated remotely, this change makes it clear that the Revised 508 Standards do not preclude this usual business practice.

In response to the commenters' requests seeking expansion of proposed E202.4 for a complete "back office exemption," the Board, after careful consideration, declines to make a change. People with disabilities frequently perform "back office" IT work and the majority of these job functions can be addressed with assistive technology. The Board is sensitive to concerns raised by some commenters, that ICT will often not be accessible when there is a physical problem or failure with the equipment. We note that we did not provide a complete exception for maintenance functions in the proposed rule, as it only intended the requirements concerning the accessibility of operable parts to apply to the normal operation of ICT by end-users. In order to ensure clarity in the final rule, in addition to the edit to the definition for "operable part" mentioned above, we have revised 407.1 in the final rule to make the application of these Standards to normal operation explicit. This is discussed in further detail below in Section IV.F. (Summary of Comments and Responses on Other Aspects of the Propose Rule – Chapter 4: Hardware – 407). In addition, we note that the exception for maintenance spaces which are frequented only by service personnel for maintenance, repair, or occasional monitoring is consistent with the ADA and ABA Accessibility Guidelines. 36 CFR part 1191 (stating that "Spaces frequented only by service personnel for maintenance, repair, or occasional monitoring of equipment shall not be required to comply with these requirements or to be on an accessible route"). Therefore, in the final rule, we have not made any changes to proposed E202.4, with the exception of its renumbering (final E202.5).

E203 Access to Functionality

The NPRM proposed to require that all ICT be accessible to and usable by individuals with disabilities, either directly or by use of assistive technology. This section was based on the existing 508 Standards (36 CFR §§1194.1 and 1194.2(a)). We received ten comments regarding this proposed requirement; three individuals, a disability advocacy organization, three trade associations, and three ICT companies.

An ICT company and an ICT trade association expressed concern with the proposed requirements and requested clarification on the minimum required abilities assumed for operational functions of certain products. The specific example provided was that it would be very difficult for a person who is blind to have a job operating a large volume xerographic services machine, because that person would not be able to visually monitor the complex equipment. An ICT subject matter expert in the field of geographic information systems raised concerns and recommended that the Board expand the exceptions in proposed E203 to include rich content like maps that represent information and data visually because they do not know of any other means to convey the information and data. Another commenter raised concerns about the inability to make inherently visual representations, such as motion pictures, fully accessible to a person who is blind even when assistive technologies are used. Finally, a disability advocacy organization recommended that this provision be amended to require that people with disabilities be provided training to evaluate, install, and configure assistive technology.

The Board has reviewed the comments received and find that the commenters' concerns requesting clarification of the minimum required abilities for operation functions are misplaced. The 508 Standards apply to all ICT; deliberately, they do not make assumptions regarding physical, cognitive, or sensory abilities associated with performing job tasks. Presumably, a job operating a large volume copier would include the requirement to confirm by visual inspection that output hard copy was correct. The fact that there may be specific performance requirements for certain jobs is not a sufficient justification to exempt the core functions of the ICT from the Revised 508 Standards. In response to the commenter's request for an exception for ICT that cannot be adequately represented through assistive technology, the Board notes that

the intent of the 508 Standards is to provide comparable access. In the Board's experience, the scope and nature of accessibility improves over time as technology advances. The Board has concluded that these issues are well addressed by the technical and functional performance requirements, and has declined to narrow the scoping or expand the available exceptions as suggested. Finally, in response to the request that the final rule require training, we find that such a requirement is outside the scope of these Standards and have declined to make this suggested change.

We have considered the commenters' suggestions regarding section E203, but as described above, found no reason to make substantive changes. We have made a few editorial changes to E203 in the final rule for clarity. The most significant of these editorial changes is in the title of E203.2, which is now "User Needs" instead of "Agency Business Needs."

E204 Functional Performance Criteria

The NPRM proposed that where the requirements in Chapters 4 and 5 do not address one or more features of ICT, the features not addressed shall conform to the functional performance criteria (FPC) in Chapter 3. Many comments were received regarding the individual FPC referenced in proposed E204. As the technical criteria are provided in Chapter 4, these comments are addressed below in Section IV.F. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 4: Hardware). Some of the concerns with the FPC for limited vision, limited hearing, and limited cognition are addressed in the Major Issues section of this preamble, at Section III.E. (Major Issues – Functional Performance Criteria).

We identified 22 comments concerned with proposed E204. Several of these comments indicated that the applicability of proposed E204.1 should be further clarified. An ICT company asserted that as written, proposed E204.1 could be interpreted as requiring the applicability of the FPC to be considered on a feature-by-feature basis. Specifically, this commenter explained that for software products that typically include a long list of "features," such a feature-by-feature evaluation would be quite onerous. Additionally, one commenter provided suggested text for inclusion in advisories in the final rule.

We concur with the commenter that proposed E204.1 could be misinterpreted. We intended for the functionality of the ICT to be considered holistically, and not on a feature-by-feature basis. The final rule revises this requirement and substitutes "functions" for "features," to avoid this confusion. The Board regards this change as editorial, as it seeks to clarify the intent of the proposed provision, and makes the text of the provision consistent with the chapter title and phrasing used elsewhere in the Revised 508 Standards. In response to the commenter's request for advisories, as described above, advisories are no longer published in the final rule; however, the Board intends to provide further guidance on the applicability of final E204.1 in its technical assistance.

E205.2 Public Facing

Three commenters raised concerns with proposed E205.2, specifically in regards to the application of this provision to social media platforms. One individual questioned whether social media constituted public-facing content under proposed E205.2. Another individual questioned whether third-party content added by members of the public to agency controlled social media sites would constitute public-facing content under proposed E205.2. The third commenter, a disability advocacy organization, recommended that agencies be precluded from using any social media platforms that are not compliant with the final rule.

In the NPRM preamble, we described public-facing content and included social media pages as an example of such content. 80 FR 10880, 10893 (Feb 27, 2015). The Board refers commenters on this topic to the discussion in the NPRM, as its position on this matter has not changed. Additionally, we note that under Section 508 of the Rehabilitation Act (as amended), agencies have responsibility for all content that they develop, procure, maintain, or use. 29 U.S.C. 794d. Agencies are therefore responsible for third-party content added to and maintained on their sites, and will need to develop policies and practices to ensure the accessibility of that third-party content. This is consistent with other policies and practices agencies employ regarding personally identifiable information, security, obscenities, or other concerns presented by third-party content. If an agency invokes an exception and uses inaccessible ICT to provide information and data to the public, the statute requires that the agency provide the same information and data to individuals with disabilities by an alternative means. Id. (stating that "the Federal department or agency shall provide individuals with disabilities covered by paragraph (1) with the information and data involved by an alternative means of access that allows the individual to use the information and data"). Under current law, an agency is not prevented from using an inaccessible social media platform under a provided exception, as long as the agency provides individuals with disabilities an alternative means of accessing the same information and data. Accordingly, the Board has not made a change to this requirement.

E205.3 Agency Official Communication

In addition to the changes made to E205.3, discussed above in Section III.A. (Major Issues – 508 Standards: Covered Electronic Content), a commenter expressed confusion and questioned what the difference was between a questionnaire and a survey. The Board notes it was not our

intention for this item to refer to two different types of communication. Therefore, in the final rule we have amended this item from "questionnaire or survey" to "survey questionnaire."

E205.4 Accessibility Standards

The NPRM generally proposed to replace the existing technical standards for Web, software, applications, and electronic content with incorporation by reference of the Level A and Level AA Success Criteria and Conformance requirements of WCAG 2.0, which appear at proposed E205.4. There is no direct analogy in the WCAG 2.0 Success Criteria for section 1194.22(d) of the existing 508 Standards, which states: "documents shall be organized so they are readable without requiring an associated style sheet." 36 CFR §1194.22(d).

Three individual commenters expressed concern that eliminating the requirements of section 1194.22(d) of the existing 508 Standards would significantly reduce the level of user control over customized styling (including features such as magnification, color, and contrast), which is critical to some users with low vision. Section 1194.22(d) of the existing 508 Standards requires documents to be organized so that they are readable without an associated style sheet. This enables persons with low vision to remove style sheets from Web pages so that they can change aspects of text style, such as spacing, font, color, borders, and width of reading areas. A disability advocacy organization indicated that replacing the current requirement with referenced provisions of WCAG 2.0 Levels A and AA would result in scenarios problematic for some users with low vision, such as limiting the maximum required magnification to 200 percent while permitting horizontal scrolling (WCAG Success Criteria 1.4.4). In addition, WCAG 2.0 Levels A and AA will provide for a sole fixed contrast setting instead of permitting user control over the degree of contrast (WCAG Success Criteria 1.4.3), which presents a challenge for some individuals.

We have considered commenter concerns regarding the loss of user control over customized styling, and acknowledge that some individuals who elect to use ICT without assistive technology may be affected by the loss of the requirements in section 1194.22(d) of the existing 508 Standards. However, the Board finds that the existing section 1194.22(d) requirement is detrimental to the use of assistive technology, which has well-supported the use of stylesheets for several years. All users, including users of screen reading software and other assistive technology, rely on the presence of Cascading Style Sheets (CSS) in order to format text for a variety of devices and Web browsers. In complex Web applications, CSS is also used dynamically to hide content that is not relevant to the user's current transaction and to selectively show content based on the user's choices. The need for content authors to maintain support for section 1194.22(d) had the effect of slowing the adoption of robust accessible Web content. Further, mainstream adoption of contemporary technologies (for example, ARIA or Accessible Rich Internet Applications) depends on CSS being supported. Implementation of these newer, more advanced approaches is not compatible with 1194.22(d). For these reasons, the Board declines to reintroduce the requirements of section 1194.22(d) in the Revised 508 Standards. The Board is also not persuaded that amending the language of select WCAG 2.0 Success Criteria, such as 1.4.4 (Resize Text) is a prudent approach. Requiring, for example, 400 percent magnification might allow a select number of users with low vision to use ICT without assistive technology; however, the overall consistency of the requirements, an important goal of harmonization with international standards, would be lost.

Another individual commenter suggested that the technical requirements relating to text featured in software under proposed 502.3.6 be made applicable to text in all content generally, under E205.4. The Board is not persuaded to adopt the recommendation to apply proposed 502.3.6 to all content, including Web content. Adding such a requirement to the WCAG 2.0 criteria would create harmonization issues internationally as well as among Federal agencies. The technical requirement for "boundary of text rendered on the screen" is a detail that is readily available in client-side software, but is not always available in a Web browsing environment.

The Board carefully considered the public comments and it finds that incorporation of the WCAG 2.0 standard, without modification, adequately addresses the needs of the majority of users with low vision. The Board also notes that W3C® has formed a task force charged with investigating the issue of accessibility requirements related to low vision and with creating recommendations. Low Vision Accessibility Task Force, http://www.w3.org/WAI/GL/low-vision-a11y-tf/ , (last visited Aug. 23, 2016). The Board is following that work and may incorporate their recommendations in future rulemaking.

Conforming Alternate Version

The NPRM proposed that a Web page could conform to WCAG 2.0 either by satisfying all success criteria under one of the levels of conformance or by providing a "conforming alternate version." Because WCAG 2.0 always permits the use of conforming alternate versions, the Access Board sought input on whether there were any concerns that the unrestricted use of conforming alternate versions of Web pages may lead to the unnecessary development of separate Web sites or unequal services for individuals with disabilities, and whether the Board should restrict the use of conforming alternate versions beyond the explicit requirements of WCAG 2.0. NPRM, 80 FR at 10897.

Eleven commenters responded to the proposed provision allowing conforming alternate versions. Seven of the commenters (four ICT companies and trade associations, two disability advocacy organizations, and one individual) supported the approach to conforming alternate versions proposed in the NPRM. Four commenters (two individuals, one state government agency, and an ICT trade association) opposed the approach from the NPRM.

Under WCAG 2.0, in order for a non-conforming Web page to be included within the scope of conformance by using a conforming alternate version, the alternate version must: conform at the designated level (i.e., WCAG 2.0 Level AA success criteria); provide the same information and functionality in the same language; and be as up-to-date as the non-conforming content or page. In addition to these requirements, at least one of the following must be true: (1) the conforming version can be reached from the non-conforming page via an accessibility-supported mechanism; (2) the non-conforming version can only be reached from the conforming version; or (3) the non-conforming version can only be reached from a conforming page that also provides a mechanism to reach the conforming version. W3C®, Understanding WCAG 2.0: Understanding Conforming Alternate Versions, Dec. 2012, http://www.w3.org/TR/UNDERSTANDING-WCAG20/conformance.html#uc-conforming-alt-versions-head /h.

The W3C® explains that providing a conforming alternate version is intended to be a "fallback option for conformance to WCAG and the preferred method of conformance is to make all content directly accessible." Id. While some commenters expressed specific concern that the use of conforming alternate versions could still create separate, unequal Web sites for people with disabilities, the Access Board has concluded that when the requirements for a conforming alternate version are viewed in conjunction with the W3C®'s guidance, it is clear that they are meant to be used only in the limited circumstances where the primary Web page or content cannot be made accessible for all users, typically due to a technical or legal limitation.

In the Revised 508 Standards, the Board has decided to retain the incorporation by reference to WCAG 2.0's conforming alternate version, as proposed in the NPRM. WCAG 2.0's conforming alternate versions provision provides a much clearer standard than the vague language of the existing 508 Standards. Section 1194.22(k) of the existing 508 Standards states that "[a] text-only page, with equivalent information or functionality, shall be provided to make a Web site comply with the provisions of this part, when compliance cannot be accomplished in any other way. The content of the text-only page shall be updated whenever the primary page changes." While on its face, the existing 508 Standards may seem to more strictly limit the use of alternate pages, in practice it is difficult to determine when compliance cannot be accomplished in any other way, and thus, it is easy for agencies to justify the use of text-only pages. Such alternate text-only sites often are poorly maintained, lack the same information and functionality available on the non-conforming Web page, and have out-of-date content. As explained above, the WCAG 2.0 requirement for a conforming alternate version significantly exceeds the expectations for text-only pages, and would not permit these deficiencies. Therefore, the Board has concluded that agencies using the Revised 508 Standards for conforming alternate versions under WCAG 2.0 will not create Web sites that suffer from these same problems, because the requirements for conforming alternate versions under WCAG 2.0 are so rigorous.

Despite WCAG 2.0's requirement that conforming alternate versions follow far more robust standards than the text-only pages permissible under the existing 508 Standards, some commenters have expressed concern that agencies may choose to use conforming alternate versions even in circumstances in which compliance could be achieved on the primary Web page. The Access Board expects that the stringent requirements for the use of conforming alternate versions under the Revised 508 Standards will prevent this abuse. The Board expects that an agency that decides to use a conforming alternate version of a Web page as opposed to making the main page accessible will typically do so when, as the W3C® explains, certain limited circumstances warrant or mandate their use. For example, W3C® has noted that a conforming alternate version may be necessary: (1) when a new emerging technology is used on a Web page, but the new technology cannot be designed in a way that allows assistive technologies to access all the information needed to present the content to the user (e.g., virtual reality or computer-simulated reality); (2) when it is not possible to modify some content on a Web page because the Web site owner is legally prohibited from modifying the Web content; or (3) to provide the best experience for users with certain types of disabilities by tailoring a Web page specifically to accommodate those disabilities. Id.

The Access Board does not anticipate that an agency would choose to maintain a separate conforming alternate version of a Web page for people with disabilities without a compelling reason, as maintaining separate sites in most, if not all circumstances, would be expensive and overly time-consuming. The Board notes that meeting the stringent criteria for a conforming alternate version under WCAG 2.0 is, in most cases, impractical if the primary page can be made accessible. The Access Board further notes that agencies will have a disincentive to allow conforming alternate versions of Web pages to become out-of-date, as this blatant failure to meet the requirements of WCAG 2.0 for conforming alternate versions could be evidence of noncompliance under the Revised 508 Standards. If the Board finds that use of conforming alternate versions, in practice, does not provide people with disabilities a Web experience equivalent to that of people without disabilities, the Board will consider whether rulemaking is appropriate to restrict the use of conforming alternate versions.

E206 Hardware

We received one comment on this provision from a disability advocacy organization which asserted that proposed E206 did not sufficiently include mobile phones and tablets. The Board disagrees with the commenter and finds that these products are hardware, and are therefore subject to the hardware requirements in Chapter 4 of the final rule.

E207 Software

We received one comment on this provision from a disability advocacy organization that indicated that proposed E207 did not sufficiently encompass mobile applications. The Board disagrees with the commenter and finds that such mobile "apps" are software applications and are therefore subject to the software requirements in Chapter 5 of the final rule.

The W3C® has formed a task force charged with investigating and making recommendations on the issue of accessibility requirements specific to mobile content. Mobile Accessibility Task Force, http://www.w3.org/WAI/GL/mobile-a11y-tf/ (last visited Aug. 23, 2016). The Board is following that work and may incorporate its recommendations in future rulemaking.

Additionally, the final rule contains an exception to E207.1 and E207.2 that excludes assistive technology software that supports the accessibility services of the platform. This exclusion appeared in the proposed rule as an exception to proposed 501.1. One commenter noted that the exception might be overlooked until after assistive technology was evaluated for conformance to WCAG 2.0. In response to the commenter's concern, in the final rule, the Board has moved this exception from chapter 5 to E207.1 and E207.2. The Board regards the relocation of this exception as an editorial clarification since we never intended for assistive technology to be reviewed against the WCAG 2.0 Success Criteria. Moving the exception from Chapter 5 to Chapter 2 makes this clear, but requires that the exception be repeated in multiple places.

C. 255 Chapter 1: Application and Administration

Chapter 1 of the Revised 255 Guidelines includes a general section, defines equivalent facilitation, addresses application of referenced standards, and provides definitions of terms used in the guidelines. Most of the comments received on 508 Chapter 1, discussed above in Section IV.A. (Summary of Comments and Responses on Other Aspects of the Proposed Rule — 508 Chapter 1: Application and Administration), are also applicable to 255 Chapter 1. These are noted below with the applicable section numbers. Additionally, we have made minor changes specific to the 255 Chapter 1 in response to comments to improve clarity, accuracy, and ease of use. These changes are described below.

C101.1 Purpose

An ICT trade association raised a concern that inclusion of the phrase "and related software," could be interpreted to go beyond the scope of Section 255 to cover software other than that essential to telecommunications functions. The Board agrees with the commenter that the inclusion of this phrase is problematic. The Communications Act defines telecommunications equipment to include "software integral to such equipment including upgrades." 47 U.S.C. 153(45). The FCC, in its 1999 Report and Order implementing its regulations under Section 255, went on to find that customer premises equipment likewise includes software integral to the operations and functions of the equipment. FCC 99-181, adopted July 14, 1999; Released Sept. 29, 1999, pp. 41-42. The Board has concluded that the inclusion of the term "and related software" in proposed C101.1 is unnecessary and confusing, and has deleted it from the provision in the final rule. The Board has also made changes to several definitions in the final rule, discussed below, to conform to the terminology of Section 255 and the FCC implementing regulations.

C101.3 Conventional Industry Tolerances

For the same reasons discussed above in Section IV.A. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 1: Application and Administration – E101.3), we have added "with specific minimum or maximum end points" to C101.3 in the final rule.

C102 Reference Standards

This section has been significantly reorganized and revised in the final rule. The general statements in the first two sentences regarding the application of referenced standards remain essentially unchanged from the proposed rule. However, the subsequent provisions in the proposed rule that expressly IBR the ten referenced standards into the Revised 255 Guidelines (i.e., proposed C102.2 – C102.10) have been moved in the final rule to a centralized IBR section – new Chapter 7 (Referenced Standards). This reorganization of IBR provisions was made to comply with OFR regulations that govern incorporations by reference. See 1 CFR part 51. Comments related to proposed incorporations by reference into the Revised 255 Guidelines are discussed below in Section IV.I (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 7: Referenced Standards).

C103.4 Defined Terms

In addition to the corresponding changes made to C103.4 that were described above in the Section IV.A. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 1: Application and Administration – E103.4), we have made a few additional changes based on public comments that are only applicable to the Revised 255 Guidelines.

We added a definition for "manufacturer" to final C103.4, and amended the definitions for "customer premises equipment" and "telecommunications equipment" to conform to the language of Section 255 and the FCC implementing regulations.

Finally, we received comments asking why the definitions for "closed functionality" and "ICT" in proposed C103.4 included examples that were not telecommunications equipment. The Board concurs with commenters' concerns that the examples included with those definitions in proposed C103.4 were confusing because they were not telephony products, and thus not within the scope of the 255 Guidelines. Therefore, in the Revised 255 Guidelines the Access Board has amended the definitions for "closed functionality" and "ICT" by removing the examples.

D. 255 Chapter 2: Scoping Requirements

Chapter 2 of the Revised 255 Guidelines addresses application and scoping. Most of the comments received on 508 Chapter 2, discussed above in Section IV.B. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 2: Scoping), are also applicable to 255 Chapter 2. The applicable 255 Chapter paragraph numbers are referenced below. Additionally, we have made minor changes specific to the Revised 255 Chapter 2 in response to comments to improve clarity, accuracy, and ease of use. These changes are described below.

C201.5 Design, Development, and Fabrication

An ICT subject matter expert was concerned that proposed C201.5 did not include the language from existing §1193.23(b) that directs telecommunications manufacturers to consider using people with disabilities in the design and development process. As the Board explained in the preamble of the NPRM, we did not retain this provision in the Revised 255 Guidelines because "consider" is not mandatory language and therefore is more appropriate for inclusion in advisory material providing guidance on best practices. 80 FR 10912 (Feb. 27, 2015). The Access Board is not persuaded by this commenter that the final rule should include this requirement and, as discussed above, advisory material is not included in the final rule. Therefore, this requirement has not been changed in the final rule.

C205 Software

In the final rule we have relocated an exception that excludes assistive technology software from proposed 501.1 to final C205. This relocation was necessary to avoid confusion and is described in detail above in Section IV.B. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 2: Scoping – E207).

E. Chapter 3: Functional Performance Criteria

Chapter 3 of the final rule contains functional performance criteria, which are outcome-based provisions that apply when applicable technical requirements (i.e., Chapters 4 and 5) do not address one or more features of ICT. All sections of this chapter are referenced by scoping provisions in Revised 508 Chapter 2 and in Revised 255 Chapter 2. The functional performance criteria are also used to determine equivalent facilitation under both the Revised 508 Standards and the Revised 255 Guidelines (final E101.2 and C101.2).

We have made minor changes to Chapter 3 in response to comments to improve clarity, accuracy, and ease of use. These changes are described below. In addition, two of the provisions in the final rule, 302.2 and 302.5, have been significantly amended in response to comments and a new provision, and 302.9 has been added to the final rule. These provisions are discussed above in Section III.E. (Major Issues – Functional Performance Criteria).

New Functional Performance Criteria Recommended

We received two comments (a coalition of disability rights organizations and an academic research institution) suggesting that the Board add three new functional performance criteria (FPC) to the final rule addressing depth perception, the use of ICT without gestures, and the use of ICT without human skin contact. The purpose of these recommendations was to anticipate possible developments in technology that would require the use of functions not currently addressed in the Revised 508 Standards and 255 Guidelines. Each of these suggestions are discussed below.

The requested addition for a FPC addressing depth perception would require that one visual mode of operation be provided that does not require binocular perception of depth. This commenter did not indicate what functions of ICT would require binocular perception of depth, or where this criterion might apply, other than to suggest that at some point in the future binocular perception of depth might be required to access functions of some ICT.

Similarly, the addition of a "use of ICT without gestures" FPC was suggested by a commenter without a rationale for where the criterion might be used. The functional limitations suggested by the criterion are already addressed in the FPC for limited vision. For example, a gesture-based system would not be usable by persons with no vision, since they would be unable to perceive where their gestures were to be located or performed without vision. Therefore, providing a mode of operation that does not require user vision would address those functional needs. The commenter did not apply this suggested FPC to any existing technology or technology known to be in development.

Finally, a commenter suggested a new FPC for the use of ICT without human skin contact. It is the Board's understanding that this suggestion is not technically feasible with modern touch screens which rely on capacitive touch. Capacitive touchscreen displays rely on the electrical properties of the human body to detect when and where on a display the user touches. Because of this, capacitive displays can be controlled with very light touches of a finger and generally cannot be used with a mechanical stylus or a gloved hand. See "What is 'capacitive touchscreen'?", http://www.mobileburn.com/definition.jsp?term=capacitive+touchscreen (last visited Aug. 3, 2016). While resistive, or pressure sensitive touch screens, are available for such functions as signing an ATM screen, they can only recognize one activation point at a time. This technical limitation precludes the use of resistive touch screens for common gestures used with personal devices (for example, pinch-to-zoom on a smart phone). See "Okay, but how do touch screens actually work?" at Science Line, the Shortest Distance Between You and Science, http://scienceline.org/2012/01/okay-but-how-do-touch-screens-actually-work/ (last visited Aug. 3, 2016). Most touch screen technology today uses capacitive touch.

After consideration, the Board declines to adopt any of the suggested FPC. No specific examples of real-world applications were provided for any of the suggested FPC. The suggested FPC would not have any close correlation to technical criteria in the final rule, and the access barriers theoretically covered by the suggested FPC are substantially addressed by the other FPC in the final rule. Additionally, the suggested FPC lack the necessary research and public input to determine the need and benefit of such additional criteria. Therefore, at this time, the Board declines to adopt the commenters' suggested functional performance criteria.

Section 301 General and 302 Functional Performance Criteria

We received a number of comments from a variety of stakeholders who sought clarification from the Board on the relationship between the FPC and the technical requirements. This issue has been extensively discussed and commented on during the history of this rulemaking. In the 2010 ANPRM, the Board recommended that for ICT meeting the technical requirements, the FPC did not need to be considered at all. After numerous commenters opposed this approach as being too limiting, and likely to lead to the procurement of ICT that is not actually usable by individuals with disabilities, the Board proposed in the 2011 ANPRM that ICT must conform to the FPC, even when the technical criteria are met. In response to the 2011 ANPRM, commenters noted that required conformance to the FPC would be unduly burdensome and costly, and would greatly increase the time for accessible ICT procurement, without notably improving the likelihood that accessible ICT would be procured. Accordingly, in the NPRM, we proposed that the FPC need only be met when the features of the ICT are not addressed by the provisions in Chapters 4 or 5.

Fifteen general comments were received on Chapter 3. These comments encompassed a wide variety of responses to the proposed FPC. Four commenters from disability advocacy organizations praised the approach taken by the Board in the proposed rule of requiring compliance with the FPC when the technical requirements in Chapters 4 and 5 are not applicable. Two commenters, one from an ICT trade association, and one from coalition of disability rights organizations, suggested that we adopt an approach similar to that taken in EN 301 549, where the FPC are expressed using very broad and conditional language. Three commenters, one from an accessible ICT services provider, one from a state/local agency, and one ICT company, urged the Board to reinstate the proposed approach from the 2011 ANPRM and require the use of the FPC and the technical requirements for all ICT. One commenter who self-identified as an individual with a disability recommended that we revise the language of the FPC to focus only on functional limitations, and not use disability-specific terminology. All other commenters approved of the approach proposed in the NPRM of identifying specific functional limitations using disability-specific language and noted that this approach was understandable, usable, and important in providing context for accessible solutions. Along with this support, one commenter from an ICT trade association suggested that the Access Board change the approach of describing the FPC to necessary to ensure accessibility, rather than providing more technical requirements. In the final rule, we have retained the approach proposed in the NPRM and provide disability-specific context for the functional performance criteria.

Finally, five commenters, two from disability rights organizations, two ICT companies, and an ICT trade association, requested further clarification on our proposed approach. The most specific comment came from an ICT trade association which expressed confusion about how to interpret and apply the FPC in Chapter 3 for individuals with low and limited vision in conjunction with the scoping requirement for access to "all ICT functionality" as required by proposed E203 and C201.3. This commenter requested clarification on how persons with limited or low vison were supposed to access functions on ICT such as copiers, for example, when checking copy output quality, or attempting to change paper trays. The comment also raised the concern that some functions, by their nature, such as visual inspection for copy quality, assume a certain level of ability. In response, in the final rule, we have revised the text of the provision for operable parts (final 407.1) to clarify that maintenance functions are separate and distinct from normal operations and are not covered by the provisions in Chapters 3 and 4. Only the functions of ICT used in normal operation must be made accessible. The discussion of 407.1 is found below in Section IV.F. (Summary of Other Comments and Responses on Other Aspects of the Proposed Rule – Chapter 4: Hardware). We also retained the proposed provision on status indicators (final 409.1), which requires that information on the status of ICT hardware, such as the need for maintenance, be provided visually, and by touch or sound. The discussion on 409.1 is found below in Section IV.F. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 4: Hardware – 409).

After review of all of these comments, we have decided to retain the proposed approach in the final rule of requiring the FPC where the requirements in Chapters 4 and 5 do not address one or more functions of ICT. The Board has also retained the requirement that the FPC are used when evaluating an alternative design or technology under equivalent facilitation (final E101.2 and C101.2). The approach taken in the final

rule reflects the longstanding, established practice in the Federal Government of the application of the FPC when technical requirements do not sufficiently address the features of the particular ICT at issue. It also allows for balance between providing for accessible ICT while encouraging flexibility and innovation in the development of accessible ICT. We did make changes to some of the individual FPC. The major changes are discussed above in Section III.E. (Major Issues – Functional Performance Criteria); other changes are discussed below.

302.1 Without Vision

We received three comments on this section. One of the commenters was from a disability rights organization, one was from a coalition of disability rights organizations, and one was an individual who self-identified as having a disability. One commenter commended us on the functionality and usability of the FPC addressing the functional needs of users with no vision, and had no recommendations for change. The remaining two commenters, a self-identified individual with a disability and a disability rights organization, expressed concern that the requirement was too limited and could lead some agencies to provide only an audio solution, which would not provide access for individuals who are deaf-blind. These commenters recommended that the Board add language requiring the support of auxiliary aids, such as refreshable braille devices, in order to ensure that all potential users without vision could have access. In the final rule, we have declined to modify the criterion because mandating a specific solution such as a refreshable braille keyboard would restrict the development of other potential solutions and would be costly. The Board concluded that retaining the NPRM's open ended approach is the best way to maximize potential solutions for this population of users. In addition, the Revised 508 Standards work in tandem with customized solutions developed as appropriate to accommodate the needs of individuals under Sections 501 and 504 of the Rehabilitation Act. The Revised 508 Standards ensure that all functionality of ICT is accessible to and usable by individuals with disabilities either directly or by supporting the use of assistive technology (final E203).

302.3 Without Perception of Color

We received four comments on this provision. All four commenters generally approved of the proposed provision. Three of these commenters, one from an ICT trade association and two ICT companies, requested guidance on allowable alternatives to color. In response, the Board notes that the supporting materials for the WCAG 2.0 Success Criteria contain technical assistance on the use of color. The remaining commenter, a coalition of disability rights organizations, recommended that we add the word "visual" to clarify the mode of operation. We agree with this comment and have added the word "visual" to describe the mode of operation in the final rule.

302.6 Without Speech

In response to a comment made by a coalition of disability rights organizations, the Board added the phrase where "speech is used for input, control or operation" to clarify in the final rule when this FPC is applied.

302.7 With Limited Manipulation

Three commenters (an accessible ICT services provider, a coalition of disability rights organizations, and an ICT company) requested changes to proposed 302.7. The accessible ICT services provider asserted that the provision was insufficient to address the needs of users with limited manipulation in a touch screen environment because it did not address motions that required more than one finger, such as a pinch zoom gesture, or a twisting motion that required only a single control, but might not work for individuals with some types of limited manipulation abilities. A provision in Chapter 4 addresses this concern by requiring at least one mode of operation operable with one hand that does not require tight grasping, pinching or twisting of the wrist (final 407.6). In addition, there is an exception for input controls for devices for personal use that have input controls that are audibly discernible without activation and operable by touch (final Exception 407.3). The ICT company recommended that we reference the FPC from EN 301 549 clause 4.2.7 "Usage with limited manipulation or strength." We decline to adopt the recommendation to use the language in EN 301 549 because it combined the functions of limited manipulations with limited strength, which the Board has determined are distinct functions that should be treated separately. Finally, the coalition of disability rights groups recommended that we clarify the text of the provision to make it easier to understand. In response to this comment, we have added the phrase "simultaneous manual operations" to clarify the limitation on this FPC.

F. Chapter 4: Hardware

Chapter 4 contains requirements for hardware that transmits information or has a user interface. Examples of such hardware include computers, information kiosks, and multi-function copy machines. Chapter 4 in the final rule has been substantially reorganized from the proposed rule in response to comments to improve clarity, accuracy and ease of use. The changes are described below.

401 General

An ICT trade association asserted that the Twenty-First Century Communications and Video Accessibility Act (CVAA) was the latest word from Congress, that the Board should avoid mandating technical requirements, and that the Board was exceeding its jurisdiction. As discussed above in Section I.A. (Executive Summary – Purpose and Legal Authority), both the 508 Standards and the 255 Guidelines are within the Board's purview, and the Board has not introduced any conflict with the CVAA.

402 Closed Functionality

ICT with closed functionality has limited functionality by design or choice, which limits or prevents a user from adding assistive technology. The NPRM proposed that ICT with closed functionality with a display screen must be capable of providing speech output (proposed 402).

We received numerous comments on this section. One commenter, a coalition of disability rights organizations, expressed confusion over the concept of closed functionality in software. Closed functionality as it relates to software is discussed at length in Section IV.G (Summary of Comments and Responses on Other Aspects of the Propose Rule – Chapter 5: Software) of this preamble, below, and is not addressed here. The provisions in Chapter 4 only pertain to closed functionality with regard to hardware. The same commenter also recommended that the provisions related to closed functionality be separated into a standalone chapter. The Board has not accepted this recommendation. We proposed that approach in the 2010 ANPRM and it was overwhelmingly rejected by commenters who disagreed with the approach and found it awkward to use. Therefore, in the final rule we have retained the approach from the NPRM.

This commenter, and many others representing disability rights organizations and ICT companies, also expressed concern with the structure and organization of the various provisions related to ICT with closed functionality. One commenter, a disability rights organization, suggested that provisions on transactional outputs (proposed 409) were in the wrong place and recommended that we combine the section for transactional outputs into the section on closed functionality as a subset of speech-output enabled ICT (final 402.2). Several commenters from industry (a trade association for information technology companies and a large manufacturer of business software and hardware) suggested edits to speech-output enabled ICT consistent with Section 707.5.2 of the 2010 ADA Standards.

The Board agrees that the clarity and coherence of these provisions could be improved by reorganization and has significantly revised the final rule to relocate requirements related to hardware with closed functionality to 402. We moved two exceptions that address audible output on devices with closed functionality from the proposed section on transactional outputs into the section on speech output in the final rule (proposed 409.1 Exceptions 1, 3; final 402.2 Exceptions 5, 6) and we have deleted an exception for duplicative information as unnecessary (proposed 409.1 Exception 2). Additionally, the Board has revised the provision for transactional outputs to clarify that the speech output shall be required to provide all information necessary to verify a transaction (proposed 409.1; final 402.2.2).

We also received numerous comments on technical requirements related to closed functionality. We received comments from copier manufacturers who suggested that a speech output requirement was not needed for any ICT with closed functionality that provides copying functions, because the needs of users with visual impairments were already addressed by provisions in the NPRM requiring magnification (proposed 302.2) and supporting the use of assistive technology (proposed E203). The Board disagrees with this suggestion as we have determined that it is too restrictive and has the potential of leading to a lack of access for users with visual limitations. Therefore, we have not made this recommended change in the final rule (final 302.2). If ICT is capable of attaching assistive technology, then by definition it is not considered to have closed functionality, and the provisions on speech-output for closed functionality do not apply (proposed E103; final E103; proposed C103; final C103). In addition, we have concluded that magnification alone may be insufficient to address the functional needs of users with disabilities, and the functional performance requirement for limited vision has been revised accordingly (proposed 302.2; final 302.2; and Section III.E.1. (Major Issues – Functional Performance Criteria – Limited Vision and Limited Hearing)).

Numerous commenters (disability advocacy organizations, individual commenters, and industry) recommended that the Board add a requirement to explicitly address the needs of individuals who are both deaf and blind. At the present time, the only technology that addresses these concerns is in the form of dynamic braille displays, which are prohibitively expensive, costing as much as $3,000 to $5,000 to produce a single line of refreshable braille, and up to $55,000 to produce a full page of refreshable braille, and require significant modifications in order to be incorporated into existing ICT. The Board has concluded that the many examples of ICT with speech output currently available with minimal hardware requirements are sufficient and appropriate to meet the needs of this population, and accordingly no language has been added on this issue.

We received numerous comments on user control from industry, requesting that we clarify when a particular language, such as English was required (proposed 402.2.1). We have determined it is unnecessary to address the use of languages other than English because business requirements would dictate what languages would be used for interface and speech output. If the interface of the ICT was in a language other than English, then the speech output would also be in that language. Similarly, if the interface does not support multiple languages, then the speech output would not have to support multiple languages.

Several commenters (a coalition of disability rights organizations and an academic research institution), supported the requirement for stopping and resuming audio (proposed 402.2.1), stressing that such a feature is essential when audio information is lengthy. An ICT company recommended that the Board reference the provision of EN 301 549 clause 5.1.34. The Board disagrees with this recommendation because the

EN provision duplicates the proposed requirement, and also includes additional notes that are confusing and could be interpreted as inconsistent with the basic requirement. The provision in the final rule is renumbered due to restructuring, but is otherwise unchanged from the proposed rule (proposed 402.2.1; final 402.2.4).

We received a significant number of comments on the proposed provision requiring braille instructions on hardware. Five commenters from industry, (three ICT trade associations and two ICT companies), all stated that it would be difficult for global manufacturers to use braille, and suggested that the Board follow the example in EN 301 549 and require tactile indicators instead. On the other side of the issue, three commenters (a coalition of disability rights organizations, a state/local government, and an academic research institution) all supported the proposed provision, and requested that we retain it (proposed 402.2.2; final 402.2.5).

Based on the prior experience with requiring braille instructions under the ADA and ABA Accessibility Guidelines mentioned above, and the favorable response for tactile instructions, the Board has decided to retain the provision. The braille instructions need not be lengthy, so this is an appropriate requirement for copiers and similar types of ICT, in helping provide equal access to users with low vision. We have declined to follow the approach of providing tactile indicators as indicated in EN 301 549, clause 8.5 "Tactile indication of speech mode" in v.1.1.2 (2015-04) since the EN provision as written allowed for the use of braille, but also permits other unspecified tactile indicators. Instead, we have retained the approach from the NPRM, which specifies a known and predictable method of communicating tactile instructions (final 402.2.5).

Industry commenters also objected to the proposed requirement for English braille, arguing that global markets may spur the manufacture of devices for markets where English is not used as the primary language. In response to this concern, we have revised the final rule to specify the use of contracted braille instead of Grade 2 (English) braille. The Board has also modified the reference to provision 703.3.1 of the ADA and ABA Accessibility Guidelines (proposed 402.2.2; final 402.2.5). Finally, several commenters from industry (ICT trade associations and ICT companies), and a coalition of disability rights organizations asserted that personal use devices do not need braille instruction for initiating the speech mode, and noted that the physical space available on a personal use device would be insufficient to accommodate braille instructions. In response to these comments, we have added an exception from the braille requirement for personal use devices (final 402.2.5 Exception).

The NPRM included a provision requiring volume control for ICT that provides private listening (proposed 402.3.1). Commenters from both industry and disability advocacy organizations recommended that this provision should be consistent with the provision addressing magnetic coupling (proposed 410.3). The Board agrees that the regulatory language could be strengthened to clarify the relationship between private listening and magnetic coupling. Accordingly, we have revised the provision on magnetic coupling to clarify that the requirement to provide effective magnetic coupling applies where ICT delivers output by means of an "audio transducer held up to the ear" (proposed 410.3; final 412.3).

Numerous industry commenters expressed concerns with the proposed requirement that, where ICT provides non-private listening, incremental volume control shall be provided with output amplification up to a level of at least 65 dB, and where ambient noise level of the environment is above 45 dB, a volume gain of at least 20 dB above the ambient level shall be user selectable (proposed 402.3.2). These commenters all criticized the proposed provision on technical grounds as being imprecise and incapable of determination. We were persuaded by these criticisms and have removed the requirement in the final rule.

These commenters also raised concerns with a requirement for non-private listening that requires automatic volume reset to a default level after every use, on the grounds that the proposed rule was unclear what constituted a "use" of the equipment (proposed 402.3.2). We have declined to make a change in response to this concern. Manufacturers have the ability to determine what constitutes a "use" in the context of their device. For example, a device like a walkie-talkie might reset only when turned off and on, whereas a copier machine might reset automatically after several minutes of inactivity (final 402.3.2).

The NPRM proposed in 402.4 to address the size, font, and contrast requirements for characters displayed on a screen. We received comments from a range of stakeholders (ICT trade associations and companies, two state/local, a coalition of disability rights organizations and an academic research institution). Commenters from industry objected to the size and contrast requirements as being vague and needing additional explanation. On the other hand, commenters from the state agencies, disability advocacy organizations, and academia supported the provision as being useful in providing criteria for a more accessible font style and size. The disability advocacy organizations wanted an additional requirement to specify a font size in at least one mode where ICT did not have a screen enlargement feature. We have declined to change the provision (final 402.4). The language of the provision is derived from 707.7.2 in the ADA and ABA Accessibility Guidelines. This language has proven over time to strike a fair balance as a minimum standard that is technically feasible for a broad range of devices. While the Board agrees that a more specific contrast requirement would be beneficial, there is not yet an industry consensus standard for measuring contrast as delivered. We considered the metric for contrast as specified by WCAG 2.0 Level AA Success Criterion 1.4.3 but determined that it is inapplicable here, since it only applies to source content and is not appropriate for displays, as addressed in this provision.

In the NPRM preamble we provided variable message signs (VMS) as an example of ICT with closed functionality that would be covered by Section 402 but noted that we were not aware of any VMS technology that provides audible output. We also noted that there is one voluntary consensus standard that addresses the needs of persons with low vision. In Question 18, the Board sought comment on whether it should reference the requirements for VMS in ICC A117.1-2009 Accessible and Usable Buildings and Facilities, if there were technologies that would

allow blind users to receive audible messages generated by VMS, and if VMS cannot be speech output enabled, should it at least require VMS to be accessible to people with low vision. NPRM, 80 FR 10880, 10915 (Feb 27, 2015). Several commenters, with a wide variety of backgrounds, agreed that the ICC A117.1-2009 requirements are appropriate to address the needs of many users with low vision, and that we should use those requirements even if VMS cannot be speech output enabled. The few commenters responding to our questions about technologies that might generate an audible version of VMS affirmed that the commercially available products are not sufficiently mature to justify mandating their use. Consequently, in the final rule we now reference the ICC A117.1-2009 standard and have added an exception to 402.2 Speech Output Enabled for VMS (final 402.2 Exception 1). The Board has also added a new requirement for characters on variable message signs (final 402.5) that references the requirements for VMS in ICC A117.1-2009.

Two commenters (a coalition of disability rights organizations and an academic research institution) requested that the Board add a requirement for audio cutoff. The intention of the recommendation was to ensure privacy for users of headsets. When users plugged their audio connectors into a standard connection port of ICT that delivers output through an external speaker that broadcasts information in public, the sound from the speakers would be cut off. The Board has declined to add a requirement for audio cutoff as it has determined that it is overly prescriptive, and the objective is already addressed in the final rule by 405, which addresses privacy of input and output for all individuals.

We received a detailed comment from an ICT company who suggested the addition of more requirements for products with closed functionality. The commenter recommended that the Board add five provisions from EN 301 549 onto the existing requirement for closed functionality (proposed 402). Two of the EN provisions, addressing privacy and spoken language, are dependent on unspecified external conditions such as privacy policies and undefined terms such as "indeterminate language" and are unenforceable. EN 301 549 clause 5.1.3.9 and clause 5.1.3.14. Accordingly, the Board has declined to add them to the final rule. The commenter also proposed that the Board adopt a formula for minimum text size as used in EN 301 549, clause 5.1.4. The Board has determined that this is unnecessary and would be redundant of the final rule's provision addressing minimum text size (final 402.4), which we have decided is straightforward and capable of being tested. The remaining two suggested provisions also had existing parallel provisions in the final rule: a provision on audible signals (EN 301 549, clause 5.1.5) has a parallel provision in 411 of the final rule; and a provision on tactilely discernible controls and keys (EN 301 549, clause 5.1.6, clause 5.1.6.1, and clause 5.1.6.2) is addressed in the final rule provision for tactilely discernible controls and keys (final 407.3). Accordingly, we did not add any of these recommended EN provisions to the final rule.

406 Standard Connections

The NPRM proposed that where data connections used for input and output are provided, at least one of each type of connection shall conform to industry standard non-proprietary formats (proposed 406). Several industry commenters recommended that we use the exact wording from EN 301 549, which specifies the direct or indirect use of commercially available adapters (EN 301 549, clause 8.1.2). The proposed requirement closely corresponds to §1194.26(d) of the existing 508 Standards and §1193.51(a) of the existing 255 Guidelines; the intent of this requirement is to support compatibility with assistive technology hardware. Because hardware used with assistive technology may require a different adapter from a commercially available one, the Board has concluded that it is important to retain the flexibility to allow for both non-proprietary and proprietary connections. For all these reasons, we have retained the phrasing used in the proposed rule (proposed 406; final 406).

407 Operable Parts

The NPRM contained a lengthy section addressing accessibility features of operable parts. We received several comments from industry (ICT trade association and an ICT company) requesting that we delete the provision requiring that keys and controls contrast visually from background surfaces, (proposed 407.2) as being imprecise and incapable of being measured. We have declined to delete this requirement because contrast on controls and keys is an important feature in providing access to the labels on the keys for persons with low vision. The language of the provision is derived from 707.7.2 in the ADA and ABA Accessibility Guidelines. The language has proven to strike a fair balance as a minimum standard and being technically feasible for a broad range of devices. While the Board would prefer to have a more specific contrast requirement, there is not yet an industry consensus standard for measuring contrast as delivered. The metric for contrast as specified by WCAG 2.0 Level AA Success Criterion 1.4.3 is inapplicable here, since it only applies to source content and is not appropriate for displays, as addressed in this provision. Accordingly, we have retained the provision without change from the proposed rule (proposed 407.2; final 407.2).

The NPRM proposed that at least one tactilely discernible control be provided for each function. Devices for personal use with input controls that were audibly discernible without activation and operable by touch were exempted from this requirement. Several commenters (a disability advocacy organization, two ICT trade organizations, and three ICT companies) recommended providing an exception for tactile discernibility for products that are discernable audibly or products that used other non-tactile methods to be discernable without vision. We have determined that these suggestions would make the exception overly broad. For example, tactile discernibility is essential for devices located in public spaces, such as an information transaction machine, where ambient sound may interfere with an individual's ability to perceive instructions given solely in the form of audible output. Likewise, an exception that permitted a device to rely solely on gesture controls might not be accessible to individuals who are blind or who are unable to gesture. We have retained the exception proposed in the NPRM, which is limited to personal use devices that are discernable audibly without activation (proposed 407.3; final 407.3).

The NPRM proposed that input controls be tactilely discernible and operable by touch and, where provided, that key surfaces outside active areas of the display screen shall be raised above the surrounding surface. A number of commenters (an ICT company, two ICT trade associations, and a disability advocacy organization), opposed the requirement. The commenter from the disability advocacy organization stated that raised keys would be difficult to use for some individuals with disabilities and potentially decrease accessibility. Industry commenters argued that requiring raised keys would add to the cost of designing and fabricating ICT. In response to these concerns, we have deleted the requirement that key surfaces be raised above their surroundings in the final rule. The provision in the final rule now simply requires input controls to be operable by touch and tactilely discernible without activation (proposed 407.3.1; final 407.3.1).

The proposed rule required alphabetic keys, where provided, to be arranged in a QWERTY layout, with the "f" and "j" keys tactilely distinct from the other keys. The provision further required that, where an alphabetic overlay was provided on numeric keys, the overlay must conform to the ITU-T Rec. E. 161. We received a number of comments from industry (three ICT companies and two ICT trade associations) raising concerns that some culture-dependent keyboards contained slight deviations from the strict "QWERTY" arrangement. The intent of this provision is to ensure that individuals who are blind have a point of orientation when encountering an unfamiliar device that uses alphabetic key entry. We have determined that QWERTY key arrangement, commonly used by touch typists, is the best for this purpose. However, in response to comments, we changed the reference for the required keyboard layout from "QWERTY" to "QWERTY-based" keyboards, which provides enough flexibility to be applied for settings where English is not the preferred language (proposed 407.3.2; final 407.3.2).

The proposed rule also included a provision on numeric keys, in addition to the provision on alphabetic keys discussed above. One commenter objected to the language of the provisions in the proposed rule and discussed the difficulty of requiring the "f" and "j" keys to be tactually discernable when a numeric keyboard is used for alphabetic key entry. We reviewed the language of the two provisions and saw that while the proposed provision had one sentence addressing use of alphabetic keys and a second sentence addressing the use of an alphabetic overlay on a numeric keyboard for alphabetic key entry, it was confusing. To clarify this distinction, in the final rule we have moved the requirement for alphabetic overlay for numeric keys from the provision on alphabetic keys to the associated provision on numeric keys (proposed 407.3.2 and 407.3.3; final 407.3.2 and 407.3.3).

The proposed rule had a provision requiring a fixed or adjustable key repeat rate, when a keyboard had the key repeat feature. We received several comments from industry (an ICT trade association and an ICT company), suggesting that the provision was unnecessary since a comparable key repeat requirement was also proposed for software (proposed 502.4; final 502.4). The key repeat provision for hardware is found in the existing 508 Standards §1194.23(k)(3) and we have determined that it continues to be useful for individuals with manual dexterity issues. We disagreed with the assertion by the commenters that a hardware provision for key repeat was unnecessary and could be adequately addressed solely by a provision addressing software. Accordingly, we made no change in the final rule (proposed 407.4; final 407.4).

The proposed rule included a provision related to timed responses, which proposed that a user be alerted visually, as well as by touch or sound, when a timed response was required. In addition, the user was to be provided the opportunity to request an extension of time to complete their response. We received several comments from industry (an ICT trade association and an ICT company), suggesting that the provision be deleted because a similar requirement was proposed for software (WCAG 2.0 Success Criterial 2.2.1 Timing Adjustable). The requirement for hardware to give the user the ability to extend the time for a response is found in the existing 508 Standards §1194.22(p) and we have determined that this is an important feature for a number of users, including individuals with manual dexterity issues, among others. We disagreed with the assertion by the commenters that a hardware provision for key repeat was unnecessary and could be adequately addressed solely by a provision addressing software. Accordingly, we made no change in the final rule (proposed 407.5; final 407).

The proposed rule had several requirements related to reach height which address how a user in a wheelchair can reach the operable parts of controls and keys of stationary ICT from a forward or side position. The NPRM was an expansion of requirements in the existing 508 Standards §1194.25(j), which address only side approaches to stationary ICT, to include both forward and side approaches. These revisions add flexibility for users and for manufacturers and designers of ICT (proposed 407.12; final 407.8).

A commenter addressing this reach height asked whether a paper tray on a copier could be used as a reference point for the location of any controls. A paper tray is not used as a reference point in determining either the leading edge or reference plane of stationary ICT. Access to a paper tray is considered a maintenance function, so it is not addressed by the reach requirements. We have revised the language in the final rule to clarify that the operable parts requirements apply to "operable parts used in the normal operation of ICT" (proposed 407; final 407). Normal operation, such as using keys to input data or create content or operate ICT such as a multifunction copier, is different from maintenance functions, such as changing toner on a printer. Placing paper on the surface of a copier for making copies is considered normal operation. However, replacing paper in a paper tray is considered a maintenance function, not a normal daily operation, so access to a copier paper tray is not covered under this provision.

The NPRM proposed requirements for display screens on stationary ICT (proposed 408). In the preamble to the NPRM, we sought comment on whether to add a requirement that the viewing angle of display screens be adjustable. 80 FR 10880, 10919 (Feb. 27, 2015), question 23. In response to this question, eight commenters (two ICT trade association, three ICT companies, an accessible ICT services provider, a state/local agency, and an ICT subject matter expert) all recommended against adding a provision for a tilted display screen, citing concerns that the

provision would be too prescriptive and would introduce maintenance and cost issues to the upkeep of the ICT. In response to these comments, we have decided against adding such a provision to the final rule.

409 Status Indicators

The NPRM proposed that all status indicators should be visually discernible and discernible by either touch or sound. The provision contained examples of the types of controls or keys that should be discernible. A commenter (ICT company) found this approach confusing and asked whether discernibility was a feature that needed to be available all the time, or whether it only needed to be discernible when a change of status occurred. In response, the Board removed the reference to examples of types of controls and keys. We did not specify a limitation on when discernibility was required, but have determined that a single notification of a change of state is sufficient (proposed 407.6; final 409).

411 Audible Signals

The NPRM proposed that audio signaling shall not be used as the only means of conveying information, indicating and action, or prompting a response (proposed 407.8). We received comments from a coalition of disability rights organizations which strongly supported this provision. We also received a comment from an ICT company who expressed confusion as to the meaning of the term, "audio signaling." In response to these comments, we have replaced the term "Audio Signaling" with "Audible Signals or Cues," in the final rule. This section was elevated and renumbered from a sub-provision in the proposed rule

412 ICT with Two-Way Communication

In the proposed rule, this section contained provisions for Real-Time Text Functionality (proposed 410.6). Those provisions are now reserved, pending the outcome of rulemaking by the Federal Communications Commission (FCC) as discussed in Section III.D (Major Issues – Real-Time Text). The majority of the remaining provisions in this section address features of two-way communication such as volume gain, minimized interference, and magnetic coupling. There were numerous comments on this section, resulting in the edits discussed below.

In the proposed rule, the Board referenced FCC regulations at 47 CFR §68.317 in anticipation of a pending rulemaking by the FCC on volume control covering all types of communication technology that provides two-way voice communication, to facilitate hearing aid compatibility (proposed 410.2). Currently 47 CFR §68.317 only addresses volume gain for analog and digital wireline telephones. As noted by several commenters from ICT trade associations, it does not address volume gain for wireless devices (e.g., mobile phones). We have amended the provisions on volume gain to distinguish between volume gain requirements for wireline telephones and non-wireline devices. The Board will consider further updates to these requirements at such time as the FCC completes its rulemaking on this issue.

The proposed rule contained two separate provisions addressing magnetic coupling and minimizing interference (proposed 410.3 and 410.4). We received two comments, one from an ICT trade association and one from a coalition of disability rights organizations, urging that the two provisions be combined since they address related features of ICT with two-way voice common to wireless or wireline devices. The ICT trade association stated that the phrase "to the lowest extent possible" was too subjective and should be removed, leaving the citation to the referenced standard in the provisions. In the final rule, the requirements for magnetic coupling and minimizing interference have been combined into a single provision that clarifies that, where ICT delivers output by a handset or other audio transducer that is typically held to the ear, it shall reduce interference with hearing technologies and provide a means for effective magnetic wireless coupling (final 412.3).

One commenter from an ICT trade association recommended that the Board reference the European standard ETSI ES 200 381-2 in addition to ANSI C63.19-2011 to address minimized interference on wireless handsets. We have reviewed ETSI ES 200 381-2 and determined that it covers only a subset of the frequency ranges covered by ANSI C63.19-2011, because it has a smaller operating range for devices (698 MHz to 3 GHz) compared to ANSI C63.19-2011 (698 MHz to 6 GHz). If the ETSI standard were applied by this rule, manufacturers of devices currently producing products with the broader ANSI frequency ranges could potentially reduce the ranges offered by the products, thereby reducing accessibility (proposed 410.4.1; final 412.3.1).

The NPRM included a proposed requirement for digital encoding of speech (proposed 410.5). In response to comments from industry (ICT trade associations and an ICT company), we have updated the referenced standards cited for digital encoding of speech to the current versions, ITU-T Recommendation G.722.2 and IETF RFC 6716 (also known as the Opus Codec). In addition, we have deleted the exception because the updated standards address the technical basis for the exception, and therefore it is not needed (final 412.4).

414 Audio Description Processing Technologies

In response to a comment from an ICT trade association, we have revised this provision in the final rule to clarify that the standard referenced in this section, ATSC A/53 Digital Television Standard, Part 5 (2010) only applies to ICT in the form of digital television tuners. We added a separate provision to require that ICT other than digital television tuners provide audio description processing (proposed 412; final 414).

415 User Controls for Captions and Audio Description

The NPRM proposed that ICT provide user controls for the selection of captions in at least one location that is comparable in prominence to the location of user controls for volume. It further proposed that ICT provide user controls for selection of audio description in at least one location that is comparable in prominence to the location of controls for program selection. An exception was provided for devices for personal use, which were not required to comply with the proposed provision (proposed 413).

Commenters from a coalition of disability rights organizations strongly supported this requirement but expressed concern over the exception, fearing that the language "personal use" could be interpreted so broadly as to exempt many devices from coverage. Commenters from industry objected to the language "comparable in prominence" because they found it imprecise and incapable of being tested. They asked that we either define the term or remove it. Commenters from industry also objected to the requirement to provide a physical button arguing that it would significantly impact the design of hardware devices such as remote controls.

After review of the comments, we have revised the exception to make it available when captions and audio descriptions can be enabled through system-wide platform settings. We further revised the requirement for caption selection to state that where operable parts are provided for volume control, ICT shall also provide operable parts for caption selection. The requirement for selection of audio description was likewise revised to state that where ICT provides operable parts for program selection, it shall also provide operable parts for the selection of audio description. We have concluded that these changes will provide users of captions and audio description with comparable access to those controls, without being overly prescriptive of technological solutions (final 415).

G. Chapter 5: Software

Chapter 5 contains the technical requirements for programs, procedures, rules, and computerized code that directs the use and operation of ICT, and instruct ICT to perform a given task or function. Software includes applications (including mobile apps) and operating systems, as well as processes that transform or operate on information and data. The NPRM proposed that software with a user interface, including client-side and Web applications conform to WCAG 2.0 Level AA. We have retained this requirement in the final rule. Traditional client-side software must also conform to final 502 and 503. Software, including Web applications, that are authoring tools must conform to the requirements of final 504.

Many commenters expressed concern with the complexity of the proposed rule. They urged us to adopt WCAG 2.0, and only WCAG 2.0, as the complete and sufficient set of accessibility requirements for software. Chapter 2 of the final rule incorporates WCAG 2.0 Level AA into the software requirements, and while some of what Chapter 5 requires is parallel or redundant to WCAG 2.0 Success Criteria, Chapter 5 includes requirements that go beyond WCAG 2.0, provide additional detail, or parallels those of the existing 508 Standards. The authors of WCAG 2.0 were informed by the existing 508 Standards, but since WCAG 2.0 only addresses Web content, it has natural technical limitations with its scope. Most subject experts agree that there would be a significant accessibility gap if software were only bound to Success Criteria from WCAG 2.0, and the requirements of this chapter address that gap. Accordingly, no change was made in this approach from the proposed rule to the final rule.

A state/local agency asked why the Board was not making additional references to technology standards, and asked specifically about WAI-ARIA, ATAG 2.0, and UAAG 2.0, and EPUB3. The Board agrees that these are all useful resources, but as discussed below, we have concluded that these additional standards are too detailed and prescriptive as compared to what is being addressed with our Revised 508 Standards and 255 Guidelines.

WAI-ARIA 1.0 (Accessible Rich Internet Applications 1.0, Mar. 20, 2014, http://w3.org/TR/2014/REC-wai-aria-20140320/) is a completed W3C® Recommendation but WAI-ARIA 1.1 is still under development and we cannot cite it until it is formally completed. (Accessible Rich Internet Applications 1.1 Working Draft, July 21, 2016, http://w3.org/TR/wai-aria-1.1/). It contains specifications for Web technologies like HTML5, SVG, and Ajax (short for asynchronous JavaScript and XML). WAI-ARIA can be used to create Web applications that conform to WCAG, but is not required for WCAG conformance. WAI-ARIA is a valuable specification, but the technology it addresses is too narrow for our Standards and Guidelines to require its use at this time.

Authoring Tool Accessibility Guidelines (ATAG) 2.0 is a completed W3C® Recommendation. (ATAG 2.0, Sept. 24, 2015, http://w3.org/TR/ATAG20/). The Board relied on ATAG 2.0 in developing the requirements for authoring tools included in Revised 508 Standards and 255 Guidelines (proposed 504; final 504). Since ATAG 2.0 applies to software, many of its requirements are redundant to our requirements in 502 and 503. ATAG 2.0 is very narrowly focused on Web content and is very prescriptive. For these reasons, and because of the limited use of ATAG 2.0 in the Federal sphere, the Board has declined to reference it. We have worked to ensure that there are not any conflicts between our requirements and ATAG 2.0. Authoring tools that provide Level AA conformance to ATAG 2.0 will conform to these Standards and Guidelines.

User Agent Accessibility Guidelines (UAAG) 2.0 was published as a "working group note" and there are no plans to move it forward as a W3C® Recommendation. (UAAG 2.0, Dec. 15, 2015, http://w3.org/TR/UAAG20/). This last step would be necessary for it to be characterized as an industry consensus standard so it is not appropriate to reference at this time. As an accessibility metric for certain types of software (i.e., Web

browsers, media players, document readers and other applications that render Web content), UAAG 2.0 does not have any conflicts with the requirements of these Revised 508 Standards and 255 Guidelines.

EPUB® is the distribution and interchange format standard for digital publications and documents based on open Web standards, and EPUB 3.0.1 is the current and stable version of the EPUB standard. See EPUB 3.0.1, International Digital Publishing Form, http://idpf.org/epub/301 (last visited Aug. 23, 2016). EPUB3 is an excellent file format for electronic documents and accessibility features were integrated throughout in the development of the specification. There are several popular (and accessible) platforms for reading EPUB3 content, but the software currently available for interactively editing EPUB3 content is limited. The EPUB3 format is fundamentally accessible; however, it is possible to create content that technically is in the EPUB3 file format, but not sufficiently accessible. One example would be an EPUB3 file with poor quality alternative text associated with images. WCAG 2.0 Level AA provides an appropriate rubric for assessing the accessibility of EPUB3 documents and this rule would not gain substantively from a reference to EPUB3.

501 General

As with the other chapters, Chapter 5 begins with a reference back to the scoping provisions. We heard from several commenters that people unfamiliar with standards might miss the incorporation by reference of WCAG 2.0 and that they, and others, prefer the formatting approach used by EN 301 549 where the WCAG 2.0 Success Criteria are restated as needed for each section. These commenters were concerned that the provisions of Chapter 5 were all that a software developer might pay attention to. The Board is preparing advisory material to this effect to help users of this rule avoid that oversight.

An ICT company and an ICT trade association urged the Board to modify the exception for Web applications from technical requirements in Chapter 5, which is conditional on those Web applications being fully conformant with WCAG 2.0 Level AA. These commenters urged the Board to exempt all Web applications from proposed sections 502 and 503, regardless of conformance with WCAG 2.0. They reasoned that for non-conformant Web applications, complying with these sections would not necessarily address the non-compliant aspect of the application and would introduce additional testing and compliance issues. Their position is that a conformity assessment against WCAG 2.0, perhaps using a format similar to the current Voluntary Product Accessibility Template® developed by the Information Technology Industry Council, is complete and sufficient for a Web application, so also assessing against final sections 502 and 503 would be superfluous or even onerous. One commenter gave the example of Web software missing a single text equivalent and thus being subject to the requirements of Chapter 5.

The Board supports having a single conformance model for accessible Web applications and agrees that WCAG 2.0 Level AA is generally sufficient for assessing the accessibility of Web applications. The value of a single unified standard for the accessibility of Web content outweighs the value of additional requirements particular only to certain kinds of Web applications.

However, we have declined to extend an absolute exception from the requirements of Chapter 5 for Web applications without regard to their conformance to WCAG 2.0. The Board recognizes that in some cases, reviewing those non-conforming Web applications against 502 and 503 would not identify additional accessibility concerns. In other cases, a Web applications failing against a particular WCAG 2.0 requirement, for example Success Criteria 4.1.1 Parsing, will have accessibility issues mitigated by addressing requirements from 502 and 503. Therefore, the Board has retained the exception as only being applicable to Web applications that meet WCAG 2.0 Level AA.

In addition, we have narrowed the exception to Web applications that are not isolated from the operating system or the platform they run on. During its examination of this exception, the Board became concerned that certain Web applications that had access to platform accessibility services (and which conformed to WCAG 2.0) were not always compatible with certain assistive technology (such as screen reading software). We concluded that the Exception to 501.1 should be somewhat narrowed from that of the proposed rule, to exclude only Web applications that do not have access to platform accessibility services. This qualification is important because major developers are working hard to make the distinction between desktop and Web applications less apparent to the end-user. As this class of Web applications mature, it is reasonable to anticipate that they might gain the ability to use the accessibility features of the underlining platform they run on. Accordingly, the 501.1 Exception has been changed in the final rule to only be for those Web applications that conform to WCAG 2.0 Level AA and do not have access to platform accessibility services (directly or through included components).

An ICT company and an ICT trade association disagreed with inclusion of Exception 2 in proposed 501.1, which proposed to exempt assistive technology from the technical requirements in Chapter 5 when assistive technology supports platform accessibility services. These commenters asserted that assistive technology software should be held to the same requirements as mainstream software, and further recommended that the Board adopt an approach similar to EN 301 549, which does not distinguish between assistive technology and other software, and imposes additional requirements on assistive technology.

The purpose of Section 508 is to provide people with disabilities comparable access to ICT. Having additional requirements for assistive technology, or even just holding assistive technology to the same technical requirements as mainstream software, can be counter-productive to that purpose. For example, requiring an on-screen keyboard that is used by a sighted switch user to also be compatible with screen reading software could impose technical challenges that would decrease its utility or pose a barrier to product development. The Board does not want the 508 Standards to create an impediment to Federal agencies procuring assistive technology they need for their employees with disabilities.

However, we are aware that in order for mainstream software to work with all assistive technology, the assistive technology must use the accessibility services of the platform. We have retained this requirement as the basis on which assistive technology can obtain the exception from the requirements of Chapter 5. The exception for assistive technology was moved from Chapter 5 to Chapter 2 (final E207.1; E207.2; C205.1; and C205.2) to better ensure that assistive technology developers would not be asked for unnecessary conformity assessment reviews.

502 Interoperability with Assistive Technology

The NPRM proposed that users have control over documented accessibility features (proposed 502.2.1) and that software not disrupt documented accessibility features (proposed 5.2.2.2). An ICT company and an ICT trade association recommended adding an exception to this latter requirement for "when requested to do so by the user during the operation of the software."

We have not changed the requirement from the proposed rule. The suggested edit is not necessary since if the user is changing the setting, then the accessibility feature could not be reasonably characterized as having been disrupted. User selection and control of accessibility features is not the same as disrupting the accessibility features. If an agency were to disable platform settings that provide accessibility (thereby violating 502.2.2) then the agency would have the responsibility under 508 for demonstrating equivalent facilitation. This is similar to causing software to be closed to the addition of assistive technology, changing the nature of the platform to be functionally indistinguishable from closed hardware, and the requirements of 402 would be applicable.

The NPRM proposed that platform developers provide accessibility services (proposed 5.2.3) and the sub-provisions listed the requirements for software running on those platforms. The Board has changed the phrasing of 502.3 in the final rule to be more consistent with other parts of the rule but the requirements are fundamentally the same as with the proposed rule. As discussed above in Section IV.A. (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 1: Application and Administration – E103.4), in the final rule we have added a definition for "software tools" which is software used for developing software. We also made editorial changes based on input from commenters.

The sub-provisions of 502.3 come from the existing 508 Standards and other accessibility standards and specify details that the Board concluded are important for software accessibility. The authors of WCAG 2.0 included requirements from §1194.21 of the existing 508 Standards where they could (for example, an explicit requirement for keyboard accessibility is in WCAG 2.0 but was not in WCAG 1.0), but some requirements are not applicable to all technologies and therefore are not explicit in WCAG 2.0. For example, the requirement for row and column headers of data tables to be programmatically determinable (final 502.3.3) is explicit in the existing 508 Standards, and is in WCAG 1.0, but not explicit in WCAG 2.0 because WCAG 2.0 is written to be technology neutral. The Board's approach in the final rule is consistent with EN 301 549 and other standards for software accessibility.

The numbering of sub-provisions in 502.3 of the final rule has been changed significantly from the proposed rule. Commenters requested that programmatically determinable object information, values, text, and other details be separated from the requirement to set or change that object information, values, text, and other details. The proposed rule had nine sub-provisions under proposed 502.3 whereas the final rule now has fourteen, but the requirements are substantially unchanged. Another commenter suggestion was to clarify that by "table" we meant "data table," so the Board has made that explicit in the final rule.

There was a recommendation from a disability advocacy organization that the event notification provision "should be made to assure that a screen reader can retain control of the reading cursor" but did not offer a specific text change. As part of renumbering and separating the requirements, we have added a separate requirement for modification of focus cursor (final 502.3.13) which addresses this commenter's concern. An ICT company and an ICT trade association recommended adding a requirement to this section, "Execution of Available Actions." The proposed rule contained an equivalent requirement (the second of two sentences in proposed 502.3.7) and in the final rule it is a separately numbered provision (final 502.3.11) requiring that: "Applications shall allow assistive technology to programmatically execute available actions on objects." This provision is intended to address scenarios such as when a person is using screen reading software and encounters a button control with four options. The person should not only hear the description of the control, but also be able to select any one of those four options through the usual keystrokes used with the screen reading software.

Section 502.4 in the final rule is unchanged from the proposed rule. It lists seven requirements from ANSI/HFES 200.2, Human Factors Engineering of Software User Interfaces. In the NPRM preamble the Board asked if the cost was excessive or if there was another authoritative standard we could use. An ICT company and an ICT trade association confirmed the resource as being unique. These two commenters and a Federal agency characterized the standard as relatively expensive and asked if the Board could instead excerpt the seven cited requirements in full. As noted in the preamble to the proposed rule, the seven cited requirements mostly predate the existing 508 Standards and are common features of operating systems. For people familiar with accessibility features, the requirements are readily apparent just from the titles cited in the final rule. Therefore, the final rule retains a reference to the ANSI/HFES 200.2 standard.

One ICT company recommended adding some additional requirements for assistive technology interoperability that parallel clauses 11.3.2.2 and 11.3.2.3 in EN 301 549. The Board declines to follow this recommendation as we have determined that 502.3 in the final rule already contains

equivalent technical requirements for assistive technology interoperability, and is simpler and more practical to apply relative to the EN approach, without compromising accessibility.

503 Applications

The proposed rule included a general requirement that applications must permit users to set their preferences from platform settings for color, contrast, font type, and focus cursor (proposed 503.2). For example, a user with low vision might want the default windowing scheme to use yellow on black text with an 18 point sans-serif font. An exception to this provision exempts applications that are designed to be isolated from their underlying platform software (such as Web applications) from this requirement. We received several comments (from individuals, a disability advocacy organization, and an accessibility ICT services provider) concerning the scope of the exception. These commenters acknowledged that certain technologies (such as Adobe® Flash®) were properly exempted, but thought that the exception was otherwise overbroad by sweeping in other types of Web applications (which were unspecified). More generally, some of these commenters also suggested that the Board broaden 503.2 so that the requirement for pass-through of user preferences apply to Web content, as well as applications.

With respect to commenters' suggestion of overbreadth, the Board declines to revise the exception to apply only to certain types of Web applications. We are aware of no discernible basis for differentiating between Web applications that do and do not warrant the exception, nor did commenters offer any such criteria. It is not technically feasible to require Web applications to use platform preferences because generally the developer of a Web application has no way of knowing what font characteristics a reader will be using for text in windows of their operating system. Applications, including Web applications, which qualify for the exception to use platform settings are still subject to the other requirements of Chapter 5, including the requirements referenced by WCAG 2.0 Level AA.

Likewise, the Board finds commenters' suggestion that the scope of proposed 502.3 be broadened to include Web content to be misplaced. Section 502.3 in the final rule, as with all of Chapter 5, addresses technical requirements for accessibility of software, not Web content. In any event, requiring Web content to meet requirements for pass-through of user preferences would face the same technical challenges as Web applications.

504 Authoring Tools

This section contains additional requirements for software used to create and edit content and documents. The major substantive change from the proposed rule is the addition of a new requirement (final 504.2.2) that authoring tools capable of creating full-featured PDFs (that is, a PDF that conforms to PDF 1.7, also known as ISO 32000-1) must also support creating PDFs conforming to PDF/UA-1. PDF/UA-1 is an extension to PDF 1.7, meaning that PDF/UA-1 is only applicable to PDFs that already conform to PDF 1.7.

Based on comments from a standards developing organization, an ICT trade association, and an ICT company, we have made some editorial changes to proposed sections 504.2, 504.3, and 504.4 for the final rule. For example, "all features and formats" in the proposed rule have been changed to "all supported features and, as applicable, to file formats" in the final rule, to clarify that the limitations of the file formats be taken into consideration.

A disability advocacy organization commented that the accessibility features should be turned on by default, but the Board has decided that would be overly prescriptive. In addition, such a requirement could interfere with automated testing of content for accessibility features. For example, it is significantly easier to identify missing alternative text (as an error) than it is to test for overuse of placeholder or default alternative text. In response to requests from commenters, the Board also plans to incorporate examples from EN 301 549 into forthcoming technical assistance materials.

The NPRM proposed that authoring tools prompt authors to create content that conforms to WCAG 2.0 Level AA, and went on to specify that the tools should provide the option for prompts during initial content creation or when the content is saved (proposed 5.4.3). Based on a commenter observation that accessibility features might best be addressed in the middle of a document workflow process, the last sentence from proposed 504.3 has been deleted in the final rule. The Board agrees that prompts and conformance checks can be performed at any point, not just upon content creation or when saving a file.

H. Chapter 6: Support Documentation and Services

601 General

Chapter 6 contains accessibility requirements for ICT support documentation and services. This section requires support services such as help desks, call centers, training services, and automated self-service technical support systems that provide documentation addressing accessibility and compatibility features available in accessible formats. We received multiple comments on the application of the PDF/UA-1 standard to electronic support documentation under proposed 602.3. Those comments are discussed in Section III.C. (Major Issues – Incorporation by

Reference of PDF/UA-1). Additionally, we received a few comments on some of the other proposed provisions of Chapter 6, which are discussed below.

602 Support Documentation

The NPRM proposed a provision addressing alternate formats for non-electronic support documentation for people who are blind or have low vision (proposed 602.4). The Board received two comments on this provision, one from a state/local agency, and another from a disability advocacy organization. Both commenters asked that we broaden the application of proposed 602.4 to clarify that alternate formats must be provided to any requester with a disability, not just individuals who are blind or have low vision. The Board concurs with this and has amended 602.4 to require alternate formats usable by "individuals with disabilities." The intent of this provision is to address the needs of individuals whose disability makes it difficult to use hardcopy materials. Examples of such disabilities include blindness, low vision, fine motor impairments, and limited cognitive, language and learning abilities.

We received an additional comment from a disability advocacy organization requesting that a notification of the availability of alternate formats be prominently displayed, and that the alternate format provided be that of the requestor's choosing. The final rule requires that support documentation be provided on request in alternate formats usable by individuals with disabilities. We do not agree that mandating a particular placement for notification of this is necessary. In addition, the Board does not find that it is reasonable to require manufacturers and government agencies to create alternate documentation in every format requested. We anticipate that most manufacturers and agencies will provide accessible softcopy to those that need it, but manufactures are also permitted the flexibility to instead provide non-electronic support documentation in formats such as large print and braille if they choose to do so. We have concluded that the language of the final rule adequately ensures that alternate formats of electronic support documentation will be made available to individuals who need them, without overburdening manufacturers and government agencies.

603 Support Services

Three commenters discussed the proposed provision regarding support services to include information on accessibility and compatibility features of ICT (proposed 603.2). One commenter was a self-identified individual with a learning disability, one was an accessible ICT services provider, and one was a disability advocacy organization. All three commenters suggested that the Board add language to the provision mandating continuing education for personnel who staff help desks. The Board understands the concern, but declines to add the suggested language as it is overly prescriptive. We intend to provide technical assistance after the final rule has been promulgated that will address training programs as an example of a best practice in complying with this provision. Therefore, this provision is unchanged in the final rule.

I. Chapter 7: Referenced Standards

This new chapter, which provides a centralized IBR section for standards referenced in the Revised 508 Standards or Revised 255 Guidelines, was added to the final rule to comply with OFR regulations that govern incorporations by reference into the Federal Register. See 1 CFR part 51. This reorganization does not alter or change in any way the underlying application of the ten referenced standards in the revised standards and guidelines. Each of these standards is still referenced and apply to the prescribed extent specified in the respective IBR provisions. Chapter 7, in effect, simply streamlines the final rule by combining the respective IBR provisions of the Revised 508 Standards and 255 Guidelines into one consolidated IBR section.

With respect to the NPRM's proposed IBR under Section 508, a number of commenters provided input on the proposed referenced standards. Several commenters raised concerns about the specific technical application of certain standards proposed for incorporation. These comments are addressed above in the applicable parts of Section III (Major Issues) and Section IV (Summary of Comments and Responses on Other Aspects of the Proposed Rule).

In addition, several commenters suggested that the Access Board reference other, additional standards in the updated 508 Standards. While several of the suggested standards serve as useful resources, the Board has determined that their incorporation into the standards is not necessary. With the exception of EN 301 549 (which is addressed below), the Board's bases for declining the suggested reference of additional standards are discussed above in Section IV.G (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 5: Software).

Of the 32 commenters mentioned above, 22 addressed the potential incorporation by reference of EN 301 549. Five commenters (three ICT companies and two ICT trade associations) suggested that the Access Board reference EN 301 549 as the sole technical standard for accessibility, or, at the very least, deem conformance with EN 301 549 as compliance with the Revised 508 Standards. These commenters made their recommendations in the interest of harmonization and, as one commenter put it, "promoting broader commercialization of accessible ICT systems." In contrast, one commenter (an international disability advocacy organization) applauded the proposed rule as an improvement on

several aspects of EN 301 549. This commenter also noted that, after publication of this final rule, EN 301 549 might well be revised to meet the higher (and, for some areas, more specific) accessibility requirements in the Revised 508 Standards.

For several important reasons, we decline to follow some commenters' suggestion that the Access Board incorporate by reference EN 301 549 into the final rule (or otherwise deem conformance with this European specification to be compliance with Section 508). In sum, EN 301 549 was not developed using a voluntary consensus process, which makes this specification unripe for incorporation by reference into Federal regulations. Moreover, even assuming that EN 301 549 was an appropriate standard for incorporation by reference, reference in the Revised 508 Standards would be both unnecessary (e.g., due to the high degree of harmonization between the Standards and the European specification) and contrary to law (e.g., certain EN 301 549 provisions failing to provide sufficient accessibility under Section 508). Each of these considerations are discussed below.

First, EN 301 549 cannot be incorporated by referenced in the final rule because this European specification was not adopted through the requisite voluntary consensus standard development process. Under section 12(d) of the National Technology Transfer and Advancement Act of 1995 (codified at 15 U.SC. 272 note) (NTTAA), Federal agencies are directed to use technical standards developed by voluntary consensus standards bodies (as opposed to government-unique standards) when carrying out their regulatory functions unless doing so would be inconsistent with applicable law or otherwise impractical. OMB Circular A-119, which provides Federal agencies with interpretive guidance on the NTTAA, specifies that standards must be developed under processes that feature five enumerated characteristics to be deemed "voluntary consensus standards" (i.e., openness, balance, due process, appeals process, and consensus). See OMB, Circular A-119, Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities §§ 2(d)–(e) (revised Jan. 27, 2016).

EN 301 549, however, was not developed under such a process. Mandate 376, which was issued by the European Commission and tasked the European standardization bodies (i.e., CEN, CENELEC, and ETSI) with development of a harmonized set of functional accessibility requirements for publicly-procured ICT, did not require use of a voluntary consensus process; instead, this mandate merely provided that CEN/CENELEC/ETSI "shall work in close cooperation with relevant stakeholders" when developing the European procurement specification that became EN 301 549. See European Commission, Mandate 376 § 4 (Dec. 7, 2005), available at http://www.etsi.org/WebSite/document/aboutETSI/EC_Mandates/m376en.pdf. Additionally, while there was public input during the development of EN 301 549 by various stakeholders (including ICT industry representatives and some consumer groups), it does not appear that the process was sufficiently open or balanced to satisfy the requirements of Circular A-119. See, e.g., ACT NOW! EDF Position on the European Standard on Accessibility Requirements for Public Procurement of ICT, EASPD, http://www.easpd.eu/en/content/act-now-edf-position-european-standard-accessibility-requirements-suitable-public (last accessed Aug. 23, 2016) (noting concern that interests of persons with disabilities were not sufficiently represented during the development of EN 301 549 due to non-voting status of disability rights organizations); VVA Europe Ltd., European Association for the Coordination of Consumers Representation in Standardisation (ANEC), Preliminary Study on Benefits of Consumer Participation in Standardisation to All Stakeholders 45-52 (Nov. 13, 2014), available at http://www.anec.eu/attachments/ANEC-R&T-2014-SC-006.pdf (noting similar concerns with respect to consumer groups) Thus, while EN 301 549 represents an important step towards a more accessible ICT environment and serves as a meaningful set of technical specifications for public procurements of ICT in the European Union, it is not a voluntary consensus standard within the meaning of Circular A-119.

Moreover, even assuming that EN 301 549 was appropriate for incorporation by reference into the Revised 508 Standards, there is already broad harmonization between EN 301 549 and the final rule. As noted in prior preamble sections summarizing key aspects of the final rule and describing its rulemaking history, the timelines for development of the Revised 508 Standards and EN 301 549 largely overlapped; consequently, there was considerable coordination amongst the Federal entities (Section 508) and private organizations (CEN/CENELEC/ETSI) working on their respective technical accessibility standards for public ICT procurements. See Sections I.B.3 (Executive Summary – Summary of Key Provisions – Harmonization with International Standards) & II.F (Rulemaking History – Harmonization with European Activities).

Harmonization with international standards has been a guiding principle for this rulemaking from its earliest stages. For example, TEITAC Advisory Committee included several international representatives (including, notably, the European Commission), recognized the importance of standardization across markets worldwide, and coordinated its work with standard-setting bodies in the U.S. and abroad. See II.B (Rulemaking History – TEITAC Advisory Committee 2006-2008) (summarizing TEITAC Advisory Committee deliberations and report). Moreover, in the 2011 ANPRM, the Access Board express noted the standardization work going on in Europe at the time. See 76 FR at 76642, 76644–45. Indeed, one of the Access Board's primary reasons for issuing a second ANPRM in 2011 was to afford the Joint Working Group on eAccessibility3 *(#n3)* and the European Commission an opportunity to see the Board's progress and to promote harmonization. Id. at 76642. Consequently, EN 301 549 – which was initially finalized in 2014 – was largely harmonized with the Board's 2011 ANPRM. Compare, e.g., ETSI, EN 301 549 V1.1.1 (2014-02) with U.S. Access Board, 2011 ANPRM, Draft Updated ICT Standards and Guidelines, available at https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/draft-rule-2011 *(https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/draft-rule-2011)* ; see also ETSI, EN 301 549 V1.1.2 (2015-04).

Harmonization, however, does not necessarily mean that the technical requirements for accessibility are exactly the same as between the final rule and EN 301 549. Rather, harmonization exists when the two sets of technical specifications are complimentary, in the sense that compliance

with each can be achieved simultaneously without conflict. The Access Board evaluated EN 301 549 on a provision-by-provision and has determined that there are no conflicts between the technical requirements in the final rule and those specified in EN 301 549. However, we also concluded that, in some situations, EN 301 549 does not provide sufficient accessibility.4 *(#n4)* This conclusion was also shared by several NPRM comments, principally European disability rights organizations. These commenters urged the Board to "stick to its proposal," especially in relation to requirements for functional performance criteria, real-time text interoperability, and wideband audio. These commenters not only applauded the proposed rule's high level of harmonization achieved with EN 301 549, but also expressed hope that the European specification would be revised at a future date to conform to the clearer requirements in, and higher levels of accessibility achieved by, the proposed rule.

Lastly, in any event, reference to EN 301 549 would be premature at this time because the specification is still likely to undergo revision after publication of the final rule. In December 2015, the CEN/CENELEC/ETSI Joint Working Group on eAccessibility met and concluded that "[a]t this moment there is consensus within [the Joint Working Group] on the need to revise EN 301 549 as soon as possible, with the aim to improve the document and to harmonize it with the next version of Section 508 as soon as [it] is public." European Joint Working Group on eAccessibility, Draft Minutes 9th eAcc Meeting 7 (Dec. 10, 2015), http://www.itu.int/en/ITU-T/jca/ahf/Documents/Doc%20219.pdf /h

For the foregoing reasons, the Access Board declines to reference EN 301 549 in the Revised 508 Standards or otherwise state that conformance with EN 301 549 equates to compliance with the final rule. The Revised 508 Standards' requirements closely track the EN 301 549 phrasing where appropriate. In places where the Revised 508 Standards diverge from EN 301 549, the Board has done so deliberately because it finds that other technical requirements provide better accessibility. The Board anticipates providing technical assistance materials on its Web site to assist product manufacturers with mapping EN 301 549 requirements to the Revised 508 Standards and vice versa.

Additionally, several NPRM commenters pointed out to the Access Board that some of the specific editions of the standards proposed for IBR in the NPRM had been supplanted by newer editions or versions. For example, commenters noted that there were newer versions of ITU-T Recommendation G.722 and TIA 1083, which were respectively referenced in proposed E102.7.1 and E102.8.2. One commenter also recommended the Opus Codec (IETF RFC 6716) as a modern industry consensus standard for digital audio compression that has merits similar to ITU-T Recommendation G722.2. We concur with commenters and, in the final rule, the Board has updated the references in 702.7.2 to ITU-T Recommendation G.722.2, as well as the reference in 702.9.1 to TIA-1083-B. We also have added the Opus Codec as one of the referenced standards for digitally encoding speech in 412.4 of the final rule. (Incorporation of this standard appears at 702.8.1.)

We also made several other "housekeeping"-type changes to the standards referenced in the final rule. For example, because the Access Board is not addressing Real-Time Text at this time, see discussion above Section III.D (Major Issues – Real-Time Text), we have deleted the RTT-related references to TIA 825-A and IETF RFC 4103. In addition, because the final rule specifies requirements for characters on variable message signs (402.5) see Section IV.G (Summary of Comments and Responses on Other Aspects of the Proposed Rule – Chapter 4: Hardware), we have added a reference to ICC A117.1-2009 (Accessible and Usable Buildings and Facilities) in Chapter 7. Finally, we rearranged the list of referenced standards in Chapter 7 by alphabetical order of publisher name (rather than publisher acronym), which resulted in the reordering of some standards.

Finally, two commenters (an open government non-profit organization and an accessible ICT services provider) objected to the Access Board's incorporation by reference of any voluntary consensus standard that are was not available to the public free of charge on the ground that such standards were not "reasonably available." While the Access Board agrees that making referenced standards reasonably available to interested parties is required under both Federal administrative law and regulation, see 5 U.S.C 552(a); 1 CFR part 51, we strongly disagree with their contention that the standards referenced in the final rule do not collectively meet this standard. Prior to publication of the final rule, Access Board staff worked with the standards developing organizations (SDOs) to ensure that versions of the referenced standards were, to the greatest extent possible, available to the general public either without charge or at a reduced rate. See discussion infra Section V.G (Regulatory Process Matters – Availability of Materials Incorporated by Reference). As a result, nine of the ten standards incorporated by reference into the final rule will be available online free of charge, either because the standards developing organization makes the standard freely available on its Web site or a read-only copy of the standard will be made available on one or more SDO's online standards portal. Id. The only exception is TIA-1083-B, which is referenced in 412.3.2 and 702.9.1. In discussions with Access Board staff, the SDO (Telecommunications Industry Association) declined to make a read-only version of this standard available online. Nonetheless, TIA-1083-B is still reasonably available by purchase (i.e., publisher or online standards store) or personal inspection without charge at the offices of either the Access Board or the National Archives and Records Administration. See id.; see also 702.9 (providing information on obtaining standard from publisher).

J. Revised 508 Standards: Compliance and Effective Dates

In the NPRM, the Board noted that it was considering making the Revised 508 Standards effective six months after publication in the Federal Register. The Board also noted it was considering deferring to the Federal Acquisition Regulatory Council (FAR Council) to establish the effective date for application of the Revised 508 Standards to new ICT contracts awarded after publication of the FAR Council's final rule, as well as existing ICT contracts with award dates that precede that final rule.

The Board received 11 comments regarding the compliance date (seven from ICT companies and trade associations, two from state/local governments, one from a Federal agency, and one from an individual). Most of the commenters supported the Board's proposal to defer to the

FAR Council for establishing the compliance date for new and existing ICT contracts. However, a few of the commenters also requested more than the six-month delay suggested in the NPRM for application of the Revised 508 Standards to ICT other than procurements. These commenters asserted that a six-month delay was too short given the amount of potential remediation required for legacy technology and content, and the limited availability of resources to effect the changes.

As noted in Section IV.A (Summary of Comments and Responses on Other Aspects of the Proposed Rule – 508 Chapter 2: Scoping Requirements), the Board has incorporated a safe harbor into the Revised 508 Standards (E202.2) that, generally speaking, exempts unaltered, existing (legacy) ICT from having to upgrade or modify to conform to the Revised 508 standards. The Access Board expects that the addition of this safe harbor provision in the final rule substantially addresses some agencies' concerns about the potentially high cost of remediating currently-compliant legacy Web sites and other public-facing electronic content. In addition, to allow agencies to maximize planning and resources for timely compliance with the Revised 508 Standards, the Board has extended the compliance date for the Revised 508 Standards from six months (as proposed in the ICT NPRM) to twelve months from the date of publication of the final rule. Prior to this date, agencies must continue to comply with the existing 508 Standards. For ease of reference, the existing 508 Standards have been republished as Appendix D to 36 CFR part 1194. (Note that, while the text of each provision provided in Appendix D remains identical to the existing 508 Standards, the numbering for each has been revised to conform to CFR publication requirements.)

This one-year compliance for the Revised 508 Standards is applicable to all ICT except that which is covered by the Federal Acquisition Regulations. The Board continues to defer to the FAR Council to establish the compliance date for new and existing ICT procurements subject to the Revised 508 Standards.

While the compliance date for the Revised 508 Standards is one year from the date of publication in the Federal Register, the overall effective date of the rule remains 60 days from publication. On the effective date of the rule, the existing 255 Guidelines will be replaced by the Revised 255 Guidelines, which may then be considered or adopted by the FCC pursuant to Section 255. Once the final rule is effective, the FAR Council within six months will incorporate the Revised 508 Standards into the FAR and establish an effective date for application of these revised regulations to new and existing procurements.

V. Regulatory Process Matters

A. Final Regulatory Impact Analysis

Executive Orders 13563 and 12866 direct agencies to propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs; tailor the regulation to impose the least burden on society, consistent with obtaining the regulatory objectives; and, in choosing among alternative regulatory approaches, select those approaches that maximize net benefits. Important goals of regulatory analyses are to (1) establish whether Federal regulation is necessary and justified to achieve a market failure or other social goal and (2) demonstrate that a range of reasonably feasible regulatory alternatives have been considered and that the most efficient and effective alternative has been selected. Executive Order 13563 also recognizes that some benefits are difficult to quantify and provides that, where appropriate and permitted by law, agencies may consider and discuss qualitatively those values that are difficult or impossible to quantify, including equity, human dignity, fairness, and distributive impacts.

The Access Board contracted with an economic consulting firm, Econometrica, Inc. (Econometrica), to prepare a final regulatory impact analysis (FRIA) that assesses the likely benefits and costs of the Revised 508 Standards and 255 Guidelines. Expected benefits are evaluated and discussed and likely incremental costs for new or revised requirements are monetized for the projected 10-year regulatory timeframe. A complete copy of the final regulatory assessment is available on the Access Board's Web site (https://www.access-board.gov/ *(https://www.access-board.gov/guidelines-and-standards/communications-and-it/about-the-ict-refresh/final-regulatory-impact-analysis)*), as well the Federal Government's online rulemaking portal (https://www.regulations.gov/ *(https://www.regulations.gov/)*).

1. Summary of Methodology, Revisions, and Overall Results

The Final RIA embodies a comprehensive benefit-cost analysis that assesses the incremental costs and benefits of the Revised 508 Standards and 255 Guidelines relative to a primary baseline. While the methodological framework and assumptions underlying the Final RIA largely mirror those used in the Preliminary RIA, the final regulatory assessment nonetheless does reflect some revisions that were aimed at incorporating more recent data, responding to public comments, or accounting for changes in scoping or technical requirements in the final rule. The Access Board believes that the resulting benefit and cost estimates in the Final RIA represent a reasonable measure of the likely effects of the final rule that can be quantified and monetized. However, some potentially significant benefits (and costs) from the Revised 508 Standards and 255 Guidelines could not be evaluated in the Final RIA due to lack of data or other methodological constraints. These unquantified benefits and costs are described qualitatively in the final regulatory assessment.

On the benefits side, the Final RIA monetizes benefits under the Revised 508 Standards attributable to, among other things, increased productivity of Federal employees who are expected to benefit from improved ICT accessibility, time savings to members of the public from more accessible Federal Web sites, and reduced call volumes to Federal agencies as individuals with disabilities shift their inquiries and transactions online due to improved online accessibility. In terms of benefit-side revisions reflected in the Final RIA, the beneficiary population has been modestly expanded. In order to evaluate the impact of the new functional performance criteria addressed to limited cognitive abilities (section 302.9) and address public comments, the Final RIA adds individuals with learning and intellectual disabilities to the group of persons expected to experience monetizable benefits under the final rule (collectively referred to in the Final RIA as "addressable disabilities"). Additionally, in the Final RIA, estimates concerning time loss due to inaccessible Web sites – which factor into the benefits equation – were adjusted slightly downward for persons with vision-related disabilities and slightly upward for persons with other types of addressable disabilities. Assumptions relating to productivity benefits to Federal employees with vision disabilities from the Revised 508 Standards were also modestly increased. These adjustments to benefits assumptions were spurred by public comments and are supported by additional empirical research. See Final RIA, Section 6.

From the cost perspective, the Final RIA separately monetizes likely incremental compliance costs attributable to the Revised 508 Standards and 255 Guidelines. For Federal agencies, contractors, and vendors, estimated costs under the Revised 508 Standards include both in-house ICT (e.g., policy development, employee training, development of Web sites and electronic documents to ensure accessibility under revised standards), and procured ICT (e.g., procurement of Section 508-compliant hardware, software, services from Federal contractors and vendors). To address concerns expressed by commenters that the Preliminary RIA did not sufficiently account for the fact that, at many agencies, an ever-widening range of workers are becoming actively involved in ensuring the accessibility of electronic content, the Final RIA assumes that a larger number of Federal employees (across a wide range of job categories) will need to receive training on the Revised 508 Standards. In addition, to address some commenters' concerns regarding evaluation and remediation of covered ICT (particularly certain types of so-called "legacy" content), the final rule includes a "safe-harbor" provision that exempts existing ICT from modification to conform to the Revised 508 Standards so long as such ICT complies with the existing 508 Standards and is not altered after the date upon which agencies must comply with the Revised 508 Standards (one year from the date of publication of the final rule). As a result, no remediation costs are taken into account.

For manufacturers of telecommunications and customer premises equipment, projected costs under the Revised 255 Guidelines relate to ensuring that their respective support documentation and services (e.g., product support Web sites and electronic support documentation) comply with applicable accessibility requirements in WCAG 2.0. There were no material changes in the Final RIA relating to cost estimates for Section 255-covered equipment manufacturers under the revised guidelines.

The Final RIA (as with the Preliminary RIA) evaluates incremental benefits and costs of the final rule relative to separate baselines applicable to Sections 508 and 255. Baseline compliance costs to covered entities under the existing 508 Standards are derived from current spending levels for relevant ICT-related products, services, and personnel. Current spending by Federal agencies, vendors, and contractors on compliance with the existing 508 Standards is estimated to be $1.3 billion annually. This amount represents less than 2 percent of annual ICT spending, which is estimated at $88 billion to $120 billion, depending on which products and services are included in the total. Baseline compliance costs for telecommunications equipment manufacturers under the existing 255 Guidelines for accessible product documentation and user support is estimated at $106 million annually. Taken together, overall baseline compliance costs under the existing 508 Standards and 255 Guidelines are therefore assumed to be $1.4 billion annually.

Finally, it bears noting that, in recognition of budget constraints that may initially limit any needed increases in resources for Section 508 compliance, Federal agencies are required to comply with the Revised 508 Standards one year after publication of the final rule; thus, Federal agencies are expected to incur incremental costs starting in 2018. The Final RIA also assumes that both initial costs and benefits under the Revised 508 Standards will be spread over three years, rather than the 2-year period used in the Preliminary RIA. (A similar 3-year implementation period is assumed for Section 255-related costs and benefits in recognition that software development and similar technology tasks typically take place over an extended period of time.)

Table 3 below summarizes the results from the Final RIA in terms of likely monetized benefits and costs, on an annualized basis, from the Revised 508 Standards and 255 Guidelines. All benefit and cost values are incremental to the applicable baseline, and were estimated for a 10-year time horizon starting in 2018 (since the final rule requires Federal agencies to comply one year after its publication) and converted to annualized values using discount rates of 7 and 3 percent. Three scenarios of incremental benefits and costs are presented, using alternative parameters that are assumptions made (not based on published estimates). These three scenarios include: a low net benefit scenario using parameters that result in lower benefits and higher costs; an expected scenario consisting of expected values for assumed parameters; and a high net benefit scenario using parameters that result in higher benefits and lower costs.

Table 3 - Annualized Value of Monetized Benefits and Costs under the Revised 508 Standards and 255 Guidelines, 2018-2027 (in Millions of 2017 Dollars)

	Low Net Benefit Scenario		Expected Scenario		High Net Benefit Scenario	
	7% Discount Rate	3% Discount Rate	7% Discount Rate	3% Discount Rate	7% Discount Rate	3% Discount Rate
Monetized Incremental Benefits						
Benefits to Federal agencies from increased productivity by Federal employees with addressable disabilities	$18.2	$19.3	$47.7	$50.6	$151.8	$160.9
Benefits to individuals with addressable disabilities from improved Federal Web site accessibility	$2.8	$3.0	$2.8	$3.0	$2.8	$3.0
Benefits to Federal agencies from reduced call volumes	$10.9	$11.7	$21.9	$23.4	$32.8	$35.1
TOTAL Annualized Value of Monetized Incremental Benefits	**$32.0**	**$34.0**	**$72.4**	**$77.0**	**$187.4**	**$199.0**
Monetized Incremental Costs						
Costs to Federal agencies, contractors, and vendors:	$276.2	$287.4	$122.8	$181.1	$111.5	$117.2
(a) In-house	$150.1	$156.2	$93.8	$98.3	$60.4	$63.5
(b) Procured ICT	$126.1	$131.2	$79.0	$82.8	$51.1	$53.7
Costs to telecommunications equipment and CPE manufacturers for accessible Web sites and support documentation	$9.5	$9.6	$9.5	$9.6	$9.5	$9.6
TOTAL Annualized Value of Monetized Incremental Costs	**$285.7**	**$296.9**	**$182.4**	**$190.7**	**$121.0**	**$126.8**

It is important to note that some potentially material benefits and costs from the Revised 508 Standards and 255 Guidelines are neither reflected in the table above nor monetized in the Final RIA due to lack of data or for other methodological constraints. These unquantified benefits and costs are described qualitatively below.

2. Benefits of the Final Rule

Overall, results from the Final RIA demonstrate that the Revised 508 Standards will likely have substantial monetizable benefits to Federal agencies and persons with disabilities. As shown in Table 3 above, the annualized value of monetized benefits from these revised standards is estimated to be $ 72.4 million at a 7 percent discount rate over the 10-year analysis period (sensitivity estimates of $32 million and $187.4 million). In calculating these monetized benefits, the Final RIA makes the following assumptions: (a) one-third of the recurring annual benefits derived from accessible ICT would be realized in the first year of implementation, two-thirds of the recurring annual benefits in the second year of implementation, and full annual benefits would start in the third year of implementation; and (b) the number of individuals with vision impairments and other addressable disabilities who visit Federal agency Web sites will increase every year, but a constant proportion of those individuals will visit such Web sites every year.

It is also important to note that the final rule is expected to generate significant benefits that could not be evaluated in the Final RIA, either because they were not quantified or monetized (due to lack of data or for other methodological reasons) or are inherently qualitative. Estimating the economic impact of a civil rights-based regulatory initiative in an area – and marketplace – as dynamic as ICT is a complex and difficult task. Some of these unquantified (or inherently unquantifiable) benefits of the Revised 508 Standards are listed in Table 4 below. The fact that these benefits were not be formally assessed in this Final RIA should not diminish their importance or value.

Table 4 - Unquantified Benefits of the Final Rule

Increased employment of individuals with disabilities
Increased ability of individuals with disabilities to obtain information on Federal agency Web sites and conduct transactions electronically
Greater independence for individuals with disabilities to access information and services on Federal agency Web sites without assistance
More civic engagement by individuals with disabilities due to improved access to information and services on Federal agency Web sites
Increased ability of individuals with disabilities to evaluate, purchase, and make full use of telecommunications products due to increased accessibility of support documentation and services
Increased ability of individuals without disabilities to access information and conduct their business electronically when they face situational limitations (in a noisy place, in a low-bandwidth environment, or in bright sunlight)
Potential cost savings to Federal agencies due to reduced levels of in-person visits and mail correspondence
Larger pool of ICT developers and content creators with accessibility knowledge and skills, providing more choice to Federal agencies due to use of internationally recognized, industry-driven standards)
Potential cost savings to manufacturers of telecommunications and CPE, state and local governments, and non-profit entities, as internationally harmonized standards reduce costs for ICT manufacturers and allow them to sell a single line of accessible products and services across all types of markets
Intrinsic existence value that individuals both with and without disabilities derive from the non-discrimination and equity values served by Sections 508 and 255
Cost savings to agencies already complying with equivalent WCAG 2.0 standards because of the availability of WCAG 2.0 support materials

3. Costs of the Final Rule

The Final RIA shows that the Revised 508 Standards and 255 Guidelines will likely increase compliance costs substantially when first implemented, but will thereafter result in only a small percentage increase in recurring annual costs in later years. Overall, the Final RIA estimates that the total incremental cost of the Revised 508 Standards and 255 Guidelines is expected to be $182.4 million on an annualized basis over the 10-year analysis period, based on a 7 percent discount rate with sensitivity estimates of $285.7 million and $121 million (see Table 3 above). It is assumed that, given a variety of budget constraints Federal agencies have faced in recent years, the one-time incremental costs would be incurred across the first three years of implementation.

The Final RIA does not, however, quantify and monetize all potential compliance costs arising from the final rule – due primarily to insufficient data or for other methodological limitations. The impact of the Revised 255 Guidelines on telecommunications equipment manufacturers is, as the Final RIA notes, particularly difficult to quantify. (Information on the impact of the proposed guidelines was solicited unsuccessfully in both the 2010 and 2011 ANPRMs, as well as the 2015 NPRM.)

Some of these unquantified costs of the Revised 508 Standards and 255 Guidelines are listed in Table 5 below.

Table 5 - Unquantified Costs of the Final Rule

Possible increase in Federal Government expenditures to provide accommodations if the government hires more people with addressable disabilities
Possible decrease in the amount or variety of electronic content produced, as government seeks to reduce Section 508 compliance costs
Potential costs to state and local governments and non-profit organizations that may be required to make electronic content accessible in order to do businesses with Federal agencies
Potential costs to ICT manufacturers of developing and producing hardware and telecommunications products that comply with the revised accessibility requirements
Possible increase in social costs to people with certain vision disabilities because they would have to use commercial screen magnification tools rather than turning off the style sheets (free of charge) in order to read Web pages.
Costs of increased compliance by foreign telecommunications manufacturers shifted to U.S. end users (consumers)

In addition, incremental cost estimates in the Final RIA do not reflect other potentially influential factors that may occur over time – such as future changes in the fiscal environment and its effect on ICT budgets, the impact of recent government-wide initiatives to manage ICT more strategically, efforts to harmonize standards for a global ICT market, and trends in technological innovation.

4. Conclusion

While the Final RIA estimates that incremental costs, as assessed and monetized in the assessment, exceed the monetized benefits of the final rule, this finding represents only a piece of the regulatory story. Today, though ICT is now woven into the very fabric of everyday life, millions of Americans with disabilities often find themselves unable to use – or use effectively – computers, mobile devices, Federal agency Web sites, or electronic content. The Board expects this final rule to be a major step toward ensuring that current and future ICT is more accessible to and usable by individuals with disabilities – both in the Federal workplace and society generally. Indeed, much – if not most – of the benefits expected to accrue from the final rule are difficult if not impossible to quantify or monetize, including: greater social equality, human dignity, and fairness. These are all values that, under Executive Order 13563,[5 (#n5)] may properly be considered in the benefit-cost calculus.

Moreover, American companies that manufacture telecommunications equipment and ICT-related products would likely derive significant benefits from the harmonized accessibility standards. Given the relative lack of existing national and globally-recognized standards for accessibility of mobile technologies, telecommunications equipment manufacturers would greatly benefit from harmonization of the 255 guidelines with consensus standards. Similar benefits would likely accrue more generally to all ICT-related products as a result of harmonization. These manufacturers would earn return on investments in accessibility technology, remain competitive in the global marketplace, and achieve economies of scale created by wider use of nationally and internationally recognized technical standards.

Accordingly, when considering all unquantified benefits and costs, the Access Board, along with its consulting economic firm (Econometrica), jointly conclude that the benefits of the Revised 508 Standards and 255 Guidelines justify its costs.

5. Potential Regulatory Alternatives

We considered two alternative approaches to updating the existing 508 Standards and 255 Guidelines:

- In the 2010 ANPRM, the Board proposed a set of requirements that were based on, but not identical to, the WCAG 2.0 standards and other voluntary consensus standards. Comments received from stakeholders and the public indicated that this approach was potentially confusing, as Federal agencies, contractors, and vendors would have to make specific compliance determinations in cases where the language used in updated 508 Standards differed from that in the referenced standard.
- The Board also considered requiring ICT to comply with the full set of functional performance criteria, which state in general terms the features of ICT that ensure its accessibility to people with one or more of different types of disabilities. Comments from stakeholders indicated that this approach would make it difficult for ICT producers to be able to determine whether or not their products and services conformed to the updated 508 Standards.

Based on the public feedback on the two policy alternatives, we determined that the clearest and most cost-effective way to set out revised accessibility requirements was to identify and directly reference existing, voluntary consensus standards, wherever possible.

B. Regulatory Flexibility Act

The Regulatory Flexibility Act (RFA) requires Federal agencies to analyze the impact of regulatory actions on small entities, unless an agency certifies that the rule will not have a significant impact on a substantial number of small entities. 5 U.S.C. 604, 605 (b). Section 604 of the RFA requires agencies to prepare and make available for public comment a final regulatory flexibility analysis describing the impact of the final rule on small entities. Because the Revised 255 Guidelines regulate non-Federal entities (e.g., telecommunications equipment manufacturers), these guidelines fall within the purview of the RFA. The Revised 508 Standards, on the other hand, directly regulate only Federal entities, which are not covered by the RFA. Accordingly, the Access Board evaluates here only the impact of the Revised 255 Guidelines on small entities. The Board provides below a final regulatory flexibility analysis (Final RFA) for these final guidelines.

Objectives of, and need for, the final rule. Section 255 of the Communications Act of 1934 (47 U.S.C. 255), as amended, requires telecommunication equipment to be accessible to and usable by individuals with disabilities, where readily achievable. The Access Board is statutorily responsible for developing accessibility guidelines for telecommunications equipment and customer premises equipment (CPE). The Access Board is also required to review and update the guidelines periodically. The Federal Communications Commission (FCC), however, is solely responsible for issuing implementing regulations and enforcing Section 255. The FCC is not bound to adopt the Access Board's guidelines as its own or to use them as minimum standards.

In 1998, the Board issued the existing 255 Guidelines (36 CFR part 1193). Since then, telecommunications technology and commercial markets have changed dramatically, along with the usage of telecommunications equipment. The Access Board is thus updating the existing 255 Guidelines to keep pace with the revolution in ICT that has occurred since the promulgation of the initial guidelines nearly twenty years ago.

The Board's Revised 255 Guidelines will provide a much-needed "refresh" of the existing 255 Guidelines, and, thereby, better support the access needs of individuals with disabilities, while also taking into account incremental compliance costs to covered manufacturers of CPE and telecommunications equipment. The revised guidelines, if adopted by the FCC, will only be applicable to new products to the extent that compliance is readily achievable; they do not require retrofitting of existing equipment or retooling. Manufacturers may consider costs and available resources when determining whether, and the extent to which, compliance is required.

Significant issues raised by public comments in response to the initial regulatory flexibility analysis. The Access Board received no public comment in response to the initial regulatory flexibility analysis provided in the NPRM.

Agency response to comments filed by the Chief Counsel for Advocacy of the Small Business Administration in response to the proposed rule. The Access Board received no comments filed by the Chief Counsel in response to the proposed rule.

Description and estimate of the number of small entities to which the final rule will apply. The Revised 255 Guidelines cover manufacturers of telecommunications equipment and CPE, as well as the manufacturers of equipment that functions as telecommunications and CPE.6 *(#n6)* The Board used publicly available data from the United States Census Bureau (Census Bureau) and Small Business Administration (SBA) to estimate the number of small businesses that potentially would be affected by the revised guidelines, as well as the likely economic impact of these guidelines.

To determine the number of small businesses potentially subject to the Revised 255 Guidelines, the Board reviewed SBA's small business size standards for ICT-related industry classifications, based on the North American Industry Classification System (NAICS).7 *(#n7)* The Board determined that three NAICS-based industry classifications may be subject to the Revised 255 Guidelines. These industry categories and their accompanying six-digit NAICS codes are: (a) NACIS Code 334111 – Electronic and Computer Manufacturing; (b) NAICS Code 334210 – Telephone Apparatus Manufacturing; and (c) NACIS Code 334220 – Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing. The Board then matched these three NAICS classifications with SBA size standards (based on number of employees) to determine the number of small businesses within each respective classification.

Table 6 below provides the potential number of small businesses, based on SBA size standards, for each of the three categories of telecommunications and customer premises equipment manufacturers (by NACIS code) that may be affected by the Revised 255 Guidelines.

Table 6 - Small Businesses Potentially Affected by the Revised 255 Guidelines

NAICS code	Industry title	SBA small business size standard	Number of firms	Number of small firms
334111	Electronic Computer Manufacturing	1,250 or fewer employees	382	365
334210	Telephone Apparatus Manufacturing	1,250 or fewer employees	249	231
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	1,250 or fewer employees	748	702
TOTAL			1,379	1,298

A few notes are in order about the foregoing estimates of the number of small firms potentially affected by the Revised 255 Guidelines. First, because all telephone equipment is covered by Section 255, all entities included in the telephone apparatus manufacturing category (334210) are necessarily subject to the guidelines. However, not all entities in the remaining two industry categories (334220 and 334111) are covered by the revised guidelines because many of these entities may manufacture only equipment that falls outside the scope of Section 255. For example, only radio and broadcasting equipment that meets the statutory definition of telecommunications (that is, "the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received"), is covered by the revised guidelines. Also, computers lacking modems or Internet telephony software are not covered by the revised guidelines. However, the Board lacks quantitative information to differentiate regulated from non-regulated manufacturing firms within these two NAICS categories, as well as to determine how many of the "small businesses" in each NAICS category are subject to the final guidelines. The number of small entities listed in Table 6 that may be affected by the Revised 255 Guidelines should, therefore, be considered an upper-bound estimate.

Second, the number of small firms listed under each NAICS code may include an unknown (though likely small) number of firms that modestly exceed the applicable SBA size standard. This potential over count results from a disconnect between the particular SBA size standard for these three NAICS classifications (1,250 or fewer employees) and the manner in which annual economic statistics for U.S. businesses are compiled by the Census Bureau and SBA. Specifically, the Census Bureau's annual "Statistics of United States Businesses" (which is also used by SBA) presents firm size-based data by various predetermined size "bands" only, the closest of which is the size band for businesses with 1,000 to 1,499 employees. Because there is no principled way to segment firms employing 1,250 or fewer persons from other firms falling within the 1,000-to-1,499 employee size band, all firms in this size band are deemed "small businesses" for purposes of this Final RFA.

Third, given that manufacturers of telecommunications equipment and CPE must comply with Section 255 only to the extent such compliance is "readily achievable" (i.e., easily accomplishable and able to be carried out without much difficulty or expense), there will likely be some small firms for which compliance with the final guidelines will prove too difficult or expensive. This is not a new proposition. Under both the existing guidelines and current FCC regulations, compliance for manufacturing firms of all sizes is limited by the readily achievable limitation, though it necessarily applies with greater frequency to smaller entities. (See 36 CFR 1193.21; 47 CFR 6.3(g)). The Access Board also understands that many small firms in the three NAICS categories relevant to this analysis serve as partners or suppliers to larger firms that provide a full range of products and services. For these reasons, the Board assumes that many small firms identified in Table 6 –particularly those with fewer than 20 employees – likely would not incur new costs under the Revised 255 Guidelines. Accordingly, the mid-point estimate for the number of small businesses that may be affected by the Revised 255 Guidelines is assumed to be small firms that meet the applicable SBA size standard and employ twenty or more workers.

Description of the projected reporting, record keeping, and other compliance requirements for small entities. As discussed above, the Revised 255 Guidelines contain many requirements that are similar to the existing guidelines. There is, however, one new accessibility requirement (final 602.3) in the revised guidelines. Section 602.3 requires manufacturers of telecommunications equipment and CPE to make their electronic support documentation (such as Web-based self-service support and electronic manuals) accessible for users with disabilities by ensuring that such documentation conforms to all applicable Level A and Level AA Success Criteria and Conformance Requirements in WCAG 2.0. This new requirement for accessible electronic documentation would potentially impose new costs on small manufacturing firms. The Final RIA develops estimated incremental costs, heavily relying on the cost methodology used by the Department of Transportation (DOT) in the regulatory assessment of its recent final rule requiring, among other things, airlines to make their Web sites accessible to persons with disabilities.[8 *(#n8)*](#n8) (See Section V.A – Regulatory Process Matters – Final Regulatory Impact Analysis).

Based on the methodology and estimates used in the Final RIA, the Board's Final RFA assesses potential compliance costs under the Revised 255 Guidelines for small manufacturers of telecommunications equipment and CPE based on estimated (a) one-time costs to create accessible electronic support documentation and Web sites, and (b) recurring, annual maintenance costs. One-time costs are assumed to be spread equally

over the first three years (i.e., one-third of covered firms realizing costs in the first year, and the other two-thirds equally in years two and three), with annual maintenance costs incurred thereafter for the remainder of the 10-year regulatory horizon. Estimated compliance costs are based on firm size. For small businesses with 100 or more employees, average one-time costs are assumed to be $125,000 for bringing their respective support documentation and Web sites into compliance with the revised guidelines. For firms with fewer than 100 employees, average per-firm one-time costs under the revised guidelines are assumed to be $25,000. Annual recurring maintenance costs are estimated as twenty percent of one-time costs regardless of firm size.

Using these cost assumptions, the Final RFA evaluates the monetary impact of the Revised 255 Guidelines from three perspectives. The first scenario uses the upper-bound estimate for small businesses that may be affected by the final guidelines (i.e., all small firms meeting SBA size standards) to assess total one-time and annual maintenance costs across all affected industry categories. These costs, which should be considered an upper-bound estimate, are reflected below:

Table 7 - Estimated Incremental Costs for Small Firms Subject to the Revised 255 Guidelines (Scenario 1 – All Small Firms)

Firm size	Firms meeting SBA small business size standards	Average one-time cost per firm	Total one-time costs	Average annual maintenance cost per firm	Total annual maintenance costs
100 or more employees	136	$125,000	$17,000,000	$25,000	$3,400,000
99 or fewer employees	1,162	$25,000	$29,050,000	$5,000	$5,810,000
Total	1,298	---	$46,050,000	---	$9,210,000

Second, to reflect the reality that compliance may not be readily achievable for the smallest firms (and, as well, the fact that such firms often serve as suppliers to larger firms and thus may not be covered by Section 255), the second scenario uses the mid-point estimate for small businesses that may be affected by the revised guidelines (i.e., small firms that meet the SBA size standard and have twenty or more employees) to assess total one-time and annual maintenance costs across all industry categories. These costs, which should be considered a mid-point estimate, are reflected below:

Table 8 - Estimated Incremental Costs for Small Firms Subject to the Revised 255 Guidelines (Scenario 2 – Small Firms with 20 or More Employees)

Firm size	Firms meeting SBA small business size standards	Average one-time cost per firm	Total one-time costs	Average annual maintenance cost per firm	Total annual maintenance costs
100 or more employees	136	$125,000	$17,000,000	$25,000	$3,400,000
20-99 employees	284	$25,000	$7,100,000	$5,000	$1,420,000
Total	420	---	$24,100,000	---	4,820,000

Third, to assess the magnitude of potential compliance costs for small businesses under the Revised 255 Guidelines relative to annual receipts, the third scenario evaluates the ratio of average annualized costs per-firm to average receipts per firm for each of the three NAICS codes. Average annualized costs represent the per-firm stream of estimated one-time and recurring annual costs over the 10-year regulatory horizon at a 7 percent discount rate. Annualized costs are assumed to be consistent across the three NAICS codes for each of the two studied small firm sizes (i.e., more or less than 100 employees) because the Board does not have NAICS code-based data differentiating receipts by firm size. Annual estimated average per-firm receipts for each NAICS code, in turn, are derived from the 2012 annual dataset of the Statistics of United States Businesses (SUSB) compiled by the Census Bureau. The ratio of average per-firm annualized costs and annual per-firm receipts is then calculated for each NACIS code and firm size, with the resulting percentage serving as a metric to evaluate the relative economic significance of compliance costs to small businesses under the Revised 255 Guidelines.

The results are presented below in two separate tables by the size (in terms of number of employees) of small firms covered by Section 255.

Table 9 - Annualized Per-Firm Costs as a Percentage of Per-Firm Receipts for Small Firms with 100 or More Employees (by NAICS Code)

NAICS code	Industry title	Annualized per-firm costs (7% discount rate)	Average per-firm annual receipts† *(#t09note)*	Annualized per-firm costs as percent of per-firm annual receipts
334111	Electronic Computer Manufacturing	$34,883	$129,699,213	0.03%
334210	Telephone Apparatus Manufacturing	$34,883	$67,998,062	0.05%
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	$34,883	$63,164,314	0.06%

† *Note:* Average per-firm annual receipts based on data from the Census Bureau's 2012 annual SUSB dataset. See U.S. Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, U.S. 6-digit NAICS, detailed employment sizes (release date June 22, 2015).9 *(#n9)*

Table 10 - Annualized Per-Firm Costs as a Percentage of Per-Firm Receipts for Small Firms with 20 and 99 Employees (by NAICS Code)

NAICS code	Industry title	Annualized per-firm costs (7% discount rate)	Average per-firm annual receipts‡ *(#t10note)*	Annualized per-firm costs as percent of per-firm annual receipts
334111	Electronic Computer Manufacturing	$7,305	$11,654,754	0.06%
334210	Telephone Apparatus Manufacturing	$7,305	$7,305 $10,602,855	0.07%
334220	Radio and Television Broadcasting and Wireless Communications Equipment Manufacturing	$7,305	$7,305 $12,352,012	0.06%

‡ *Note:* Average per-firm annual receipts based on data from the Census Bureau's 2012 annual SUSB dataset. See U.S. Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, U.S. 6-digit NAICS, detailed employment sizes (release date June 22, 2015).

The results of these annualized cost/receipt analyses demonstrate that incremental costs of the Revised 255 Guidelines for small businesses—whether larger or smaller than 100 employees—are expected to be minimal relative to firm receipts. In no case would this ratio exceed one-tenth of one percent, with values ranging from a low of 0.03% to a high of 0.07%. Accordingly, based on the foregoing analysis, the Board does not believe that the Revised 255 Guidelines are likely to have a significant economic impact on a substantial number of small entities.

Description of significant alternatives to the Revised 255 Guidelines. In the Board's view, there are no alternatives to the final guidelines that would accomplish the goal of meeting the access needs of individuals with disabilities, while taking into account compliance costs of manufacturers of telecommunications equipment and CPE.

C. Executive Order 13132: Federalism

The final rule adheres to the fundamental Federalism principles and policy making criteria in Executive Order 13132. The Revised 508 Standards apply to the development, procurement, maintenance, or use of ICT by Federal agencies. The Revised 255 Guidelines apply to manufacturers of telecommunications equipment and customer premises equipment and require that equipment is designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if it is readily achievable to do so. As such, the Board has determined that the final rule does not have Federalism implications within the meaning of Executive Order 13132.

D. Executive Order 13609: Promoting International Regulatory Cooperation

Executive Order 13609 serves to promote international regulatory cooperation and harmonization. The Board has promoted the principles of the executive order by making concerted efforts with a number of foreign governments throughout the development of the Revised 508 Standards and 255 Guidelines. For example, the Board and the European Commission have made significant efforts to coordinate development of their respective ICT standards. This cooperation began with the 2005 EU-US Economic Initiative (http://trade.ec.europa.eu/doclib/docs/2006/june/tradoc_127643.pdf) and our participation in regular meetings with the U.S. Trade Representative's office and the European Commission in discussions on e-accessibility around the Transatlantic Trade and Investment Partnership (TTIP). These cooperative efforts continued through the joint work of the Access Board and representatives from the European

Commission, Canada, Australia, and Japan on the TEITAC Advisory Committee, which helped inform the requirements in the proposed 508 Standards and 255 Guidelines. In our view, the Revised 508 Standards and 255 Guidelines are the product of the Board's coordination with international regulatory partners, which will ultimately help American companies better compete globally.

E. Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act does not apply to regulations that enforce constitutional rights of individuals or enforce statutory rights that prohibit discrimination on the basis of race, color, sex, national origin, age, handicap, or disability. The Revised 508 Standards are issued pursuant to the Rehabilitation Act. When Federal agencies develop, procure, maintain, or use electronic and information technology, they are required to ensure that the electronic and information technology allows Federal employees with disabilities to have access to and use of information and data that is comparable to the access enjoyed by Federal employees without disabilities, unless doing so would impose an undue burden on the agency. The statute also requires that members of the public with disabilities seeking information or services from a Federal agency have access to and use of information and data that is comparable to that provided to other members of the public unless doing so would impose an undue burden on the agency. The Revised 255 Guidelines, in turn, are issued pursuant to Section 255 of the Communications Act, which requires manufacturers of telecommunications equipment and customer premises equipment to ensure that the equipment is designed, developed, and fabricated to be accessible to and usable by individuals with disabilities, if it is readily achievable to do so. Accordingly, an assessment of the effect of the Revised 508 Standards and 255 Guidelines on state, local, and tribal governments is not required by the Unfunded Mandates Reform Act.

F. Paperwork Reduction Act

The Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501–3521) requires Federal agencies to obtain approval from the Office of Management and Budget (OMB) before requesting or requiring a "collection of information" from the public. As part of the PRA process, agencies are generally required to provide a 60-day notice in the Federal Register concerning each proposed collection of information to solicit, among other things, comment on the necessity of the information collection and its estimated burden. 44 U.S.C. 3506(c)(2)(A). The 255 Guidelines, in both their existing and revised form, impose PRA-covered "information collection" obligations on manufacturers of telecommunications equipment and customer premises equipment by requiring such manufacturers to ensure that their support documentation and services meet specified accessibility requirements. Accordingly, in the NPRM, the Board published a notice of proposed collection of information to accompany the proposed revisions to the existing 255 Guidelines. The Board received one responsive comment, which addressed our estimated PRA-related time burdens under the proposed guidelines. We discuss below our estimates under the Revised 255 Guidelines of the projected annual time burden (in hours) on 255-covered manufacturers to make their support documentation and services accessible.

Section C206, in conjunction with the technical provisions in Chapter 6 (Support Documentation and Services), obligates manufacturers of telecommunications equipment and customer premises equipment to provide accessible support documentation and services, which constitute "collections of information" under the PRA. More specifically, the revised guidelines require covered manufacturers, when providing support documentation and services, to ensure accessibility for individuals with disabilities in four respects: (1) support documentation must list, and explain how to use, accessibility and compatibility features of telecommunications products (602.2); (2) electronic support documentation must conform to WCAG 2.0 (602.3); (3) non-electronic support documentation must be provided upon request in alternate formats (e.g., braille, large print) usable by individuals with disabilities (602.4); and (4) support services (e.g., help desks, call centers) must offer information on accessibility and compatibility features, as well as ensure a contact method that accommodates the communication needs of individuals with disabilities (603.2 and 603.3).

Taken together, these four accessibility requirements in the final rule impose PRA-covered information collection obligations on Section 255-covered manufacturers that are generally similar to those under the existing 255 Guidelines (which previously received PRA approval from OMB) (OMB Control Number 3014-0010), though compliance with WCAG 2.0 is new. The Revised 255 Guidelines do establish a new information collection by requiring that covered manufacturers ensure their electronic support documentation (such as Web-based self-service support or PDF user guides) complies with specified accessibility standards (602.3).

The Board estimates the annual burden on manufacturers of telecommunications equipment and customer premises equipment for the four categories of information collections under the final rule as follows:

Table 11 - Estimated Annual Recordkeeping and Documentation Burden

Provision in final rule	Number of respondents	Annual number of responses per respondent	Average response time (hours)	Estimated annual burden (hours)
Section 602.2	1,379	6	1.5	12,411
Section 602.3	1,379	95% of 6	300	2,358,090
Section 602.4	1,379	5% of 6	25	25 10,343
Section 603	1,379	6	.5	4,137
Total				2,384,981

These estimates are based on the Access Board's experience with the current information collection requirements under the existing 255 Guidelines, as well as public comment received in response to the 2010 and 2011 ANPRMs. (While the Board received one comment to the 2015 NPRM suggesting that our assumptions about average response times were too high, for the reasons discussed below, we believe these time estimates are sound and have carried them forward to this PRA analysis.)

Highlighted below are the key assumptions used in the burden estimation calculus reflected above in Table 11:

Number of respondents. The estimated number of manufacturers of telecommunications equipment and customer premises equipment (1,384) is based on Census Bureau/NAICS data for the three ICT-related industry classifications potentially subject to the Revised 255 Guidelines. (See Section V.B (Regulatory Process Matters – Regulatory Flexibility Act)).

Number of responses annually per manufacturer. The number of annual responses for each manufacturer (6) is based on the estimated number of new products released in 2013 according to the Consumer Electronic Association.

Average response time. The Access Board estimates the average response time to comply with the accessibility requirements in Chapter 6 of the Revised 255 Guidelines as follows:

- *Section 602.2* – The estimated response time assumes that documenting the accessibility and compatibility features will take 1.5 hours for each new product.

- *Section 602.3* – The estimated response time assumes that development of accessible electronic support documentation will take 300 hours for each new product. This estimate, in turn, is based on the assumption that each product will have, on average, 200 pages of electronic documentation, and that each page will require 1.5 hours of formatting and editing to comply with WCAG 2.0. With respect to the annual number of responses for each manufacturer, it is assumed that support documentation for nearly all new products will be provided in an electronic format given current trends in the telecommunications industry. Specifically, it is estimated that 95 percent of the six new products introduced annually by each manufacturer (7,889 products) will have electronic support documentation that must conform to the accessibility requirements for electronic support documentation in 602.3.

  An NPRM commenter expressed concern that our time estimate of 1.5 hours per page to make electronic support documentation compliant with WCAG 2.0 was overly generous, stating that 10 to 20 minutes per page would be more likely. In our experience, while text-only or other less complex documents may well take, on average, only 10 to 20 minutes per page to ensure accessibility, the electronic documents at issue here – user manuals and Web-based self-service support – are typically more complex and often feature pictures, graphics, or tables interspersed with textual material. This complexity would likely make the process of ensuring compliance with applicable accessibility requirements more time intensive as compared to text-only documents. Consequently, to be conservative, we have retained the 1.5 hours per page assumption used in both the NPRM and Preliminary RIA.

- *Section 602.4* – The estimated response time assumes that development of accessible non-electronic support documentation in alternate formats (e.g., braille, large print) will take 25 hours for each new product. With respect to the annual number of responses for each manufacturer, it is assumed that support documentation for only a few new products will have support documentation in a non-electronic format in recognition of the fact that most support documentation is now posted online or otherwise provided in electronic formats. Thus, it is assumed that only 5 percent of the six new products introduced annually by each manufacturer (415 products) will have non-electronic support documentation that must conform to 602.4.

- *Section 603.1* – The estimated response time assumes that, for each new product in a given year, manufacturers will receive three 10-minute telephone calls to support centers (or emails or chat-based interactions) from individuals with disabilities seeking information on the accessibility and compatibility features of these products.

G. Availability of Materials Incorporated by Reference

Regulations issued by the Office of the Federal Register (OFR) require Federal agencies to describe in their regulatory preambles the steps taken to ensure that incorporated materials are reasonably available to interested parties, as well as summarize the contents of referenced standards. See 1 CFR part 51.

In keeping with these obligations for materials that are incorporated by reference in the Revised 508 Standards and 255 Guidelines, the Access Board provides below: (a) information on the public availability of these ten standards (or, alternatively, how Access Board staff attempted to secure the availability of these materials to the public at no cost or reduced cost, if not already publicly available free of charge by the standards development organization); and (b) summaries of the materials to be incorporated by reference. In addition to the information provided below relating to public availability, a copy of each referenced standard is available for inspection at the Access Board's office, 1331 F Street NW, Suite 1000, Washington, DC 20004.

ATSC A/53 Part 5: 2014, Digital Television Standard, Part 5—2014 AC-3 Audio System Characteristics (2014) (see 414.1.1, 702.2.1). The standard for digital television provides the system characteristics for advanced television systems. The document and its normative parts provide detailed specification of system parameters. Part 5 provides the audio system characteristics and normative specifications. It includes the Visually Impaired (VI) associated service, which is a complete program mix containing music, effects, dialogue and a narrative description of the picture content. Availability: Copies of this standard may be obtained from the Advanced Television Systems Committee (ATSC), 1776 K Street NW, Suite 200, Washington, DC 20006–2304. Free copies of ATSC A/53 Digital Television Standard are available online at the organization's Web site (https://atsc.org/wp-content/uploads/2015/03/A53-Part-5-2014.pdf).

ANSI/AIIM/ISO 14289-1-2016, Document Management Applications – Electronic Document File Format Enhancement for Accessibility - Part 1: Use of ISO 32000-1 (2016) (PDF/UA-1) (see 504.2.2, 702.3.1). This standard (known as PDF/UA-1) defines how to represent electronic documents in the PDF format in a manner that allows the file to be accessible. This is accomplished by identifying the set of PDF components that may be used and restrictions on the form of their use. Availability: Copies of this standard may be obtained from Association for Information and Image Management (AIIM), 1100 Wayne Ave., Ste. 1100, Silver Spring, Maryland 20910. This standard is available without cost to AIIM professional members and for a small fee ($15.00) by other members of the public through the AIIM Web site (http://www.aiim.org/Resources/Standards/AIIM_ISO_14289-1). It is also the Board's understanding, based on discussions with the standards developer, that a free, read-only copy of the referenced portions of ANSI/HFES 200.2 would be made available on ANSI's IBR Standards Portal (https://ibr.ansi.org/Standards/hfes.aspx) following publication of the final rule.

ANSI/HFES 200.2, Human Factors Engineering of Software User Interfaces – Part 2: Accessibility (2008) (see 502.4, 702.4.1). This standard provides design specifications for human-system software interfaces to increase accessibility for persons with disabilities. It covers the design of accessible software for people with a wide range of physical, sensory and cognitive abilities, including those with temporary disabilities and older adults. Availability: Copies of this standard may be obtained from the Human Factors and Ergonomics Society (HFES), P.O. Box 1369, Santa Monica, CA 90406–1369. This standard is also available for purchase on the HFES Web site (http://www.hfes.org). In discussions with Access Board staff, an HFES senior representative noted that, consistent with the Society's standard practice of making read-only copies of standards available when incorporated by reference into Federal regulations, a free, read-only copy of the referenced portions of ANSI/HFES 200.2 would be made available on ANSI's IBR Standards Portal (https://ibr.ansi.org/Standards/hfes.aspx) following publication of the final rule.

ANSI/IEEE C63.19-2011 American National Standard for Methods of Measurement of Compatibility between Wireless Communications Devices and Hearing Aids (2011) (see 412.3.1, 702.5.1). This standard provides a uniform method of measurement for compatibility between hearing aids and wireless communications devices. Availability: Copies of this standard may be obtained from the Institute of Electrical and Electronics Engineers (IEEE), 10662 Los Vaqueros Circle, P.O. Box 3014, Los Alamitos, CA 90720–1264. This standard is also available for purchase on the IEEE Web site (http://www.ieee.org). Additionally, a free, read-only version of ANSI/IEEE C63.19-2011 is available on the ANSI IBR Standards Portal.

ICC A117.1-2009, Accessible and Usable Buildings and Facilities (2010) (see 402.5, 702.6.1). This standard provides technical criteria for making sites, facilities, buildings, and elements accessible to and usable by people with disabilities. Availability: Copies of this standard may be obtained from ICC Publications, 4051 W. Flossmoor Road, Country Club Hills, IL 60478-5795 (http://www.iccsafe.org . A free, read-only version of ICC A117.1 is available online at the ICC's public access standards portal (http://codes.iccsafe.org/app/book/toc/ICC%20Standards/ICC%20A117.1-2009/index.html).

ITU-T Recommendation E.161, Series E: Overall Network Operation, Telephone Service, Service Operation and Human Factors—International operation – Numbering plan of the international telephone service, Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network (2001) (see 407.3.3, 702.7.1). This standard defines the assignment of the basic 26 Latin letters (A to Z) to the 12-key telephone keypad. Availability: This standard may be obtained from ITU-T, Place des Nations CH-1211, Geneva 20, Switzerland. Free copies of ITU-T Recommendation E.161 are available online at the organization's Web site (http://www.itu.int/rec/T-REC-E.161-200102-I/en).

ITU-T Recommendation G.722.2: Series G: Transmission Systems and Media, Digital Systems and Networks, Digital terminal equipments – Coding of analogue signals by methods other than PCM, Wideband coding of speech at around 16 kbit/s using Adaptive Multi-Rate Wideband (AMR-WB) (2003) (see 412.4, 702.7.2). This standard describes the high quality Adaptive Multi-Rate Wideband (AMR-WB) encoder and decoder that is primarily intended for 7 kHz bandwidth speech signals. AMR-WB operates at a multitude of bit rates ranging from 6.6 kbit/s to 23.85 kbit/s. Availability: This standard may be obtained from the International Telecommunication Union, Telecommunications Standardization Sector (ITU-T), Place des Nations CH-1211, Geneva 20, Switzerland. Free copies of ITU-T Recommendation G.722.2 are available online at the organization's Web site (http://www.itu.int/rec/T-REC-G.722.2-200307-I/en).

IETF RFC 6716, Definition of the Opus Audio Codec (2012) (see 412.4, 702.8.1). This standard establishes specifications that define the Opus interactive speech and audio codec. The Opus codec is designed to handle a wide range of interactive audio applications, including Voice over IP, videoconferencing, in-game chat, and even live, distributed music performances. This codec scales from low bitrate narrowband speech at 6 kbit/s to very high quality stereo music at 510 kbit/s. Availability: Free copies of this standard are available online at the Internet Engineering Task Force's Web site (http://www.rfc-base.org/txt/rfc-6716.txt).

TIA-1083-B: Telecommunications—Communications Products—Handset Magnetic Measurement Procedures and Performance Requirements (2015) (TIA-1083-B) (see 412.3.2, 702.9.1). This standard defines measurement procedures and performance requirements for the handset generated audio band magnetic noise of wireline telephones. This standard also addresses magnetic interference issues not covered by 47 CFR part 68. This standard can be used to evaluate devices with analog interfaces and digital interfaces that provide narrowband and wideband transmission. Availability: Copies of this standard, which is published by the Telecommunications Industry Association (TIA), may be obtained from the IHS Standard Store (IHS), 15 Inverness Way East, Englewood, CO 80112. This standard is also available for purchase on the IHS Markit Standards Store (http://www.global.ihs.com). In March 2016, Access Board staff spoke with TIA representatives to explore potential options for making TIA-1083-B readily available to the public. TIA took the position that this standard is available for sale and is, therefore, reasonably available.

WCAG 2.0, Web Content Accessibility Guidelines, W3C Recommendation (2008) (see E205.4, E205.4 Exception, E205.4.1, E207.2, E207.2 Exception 2, E207.2 Exception 3, E207.2.1, E207.3, C203.1, C203.1 Exception, C203.1.1, C205.2, C205.2 Exception 2, C205.2 Exception 3, C205.2.1, C205.3, 408.3 Exception, 501.1 Exception, 504.2, 504.3, 504.4, 602.3, and 702.10.1). WCAG 2.0, published by the W3C Web Accessibility Initiative (W3C), specifies success criteria and requirements to make Web content more accessible to all users, including persons with disabilities. The W3C Web site also provides online technical assistance materials linked to each success criteria and technical requirement. Availability: Copies of this standard may be obtained from the W3C Web Accessibility Initiative, Massachusetts Institute of Technology, 32 Vassar Street, Room 32-G515, Cambridge, MA 02139. Free copies of WCAG 2.0, and its related technical assistance materials, are available online at W3C's Web site (http://www.w3.org/TR/WCAG20).

List of Subjects

36 CFR Part 1193

Civil rights, Communications, Communications equipment, Incorporation by reference, Individuals with disabilities, Reporting and recordkeeping requirements, Telecommunications.

36 CFR Part 1194

Civil rights, Communications, Communications equipment, Computer technology, Electronic products, Government employees, Government procurement, Incorporation by reference, Individuals with disabilities, Reporting and recordkeeping requirements, Telecommunications.

Approved by vote of the Access Board on September 14, 2016.

/s/
David M. Capozzi,
Executive Director.

NOTES

1. Subsequently, in 2015, the three European standards bodies issued an updated version of EN 301 549, which contained minor editorial changes only relative to the 2014 version. See ETSI/CEN/CENELEC, EN 301 549 V1.1.2 (2015-04), Accessibility Requirements Suitable for Public Procurement of ICT Products and Services in Europe (Apr. 2015), available at http://www.etsi.org/deliver/etsi_en/301500_301599/301549/01.01.02_60/en_301549v010102p.pdf.
2. The existing 508 Standards require that technology provide at least one mode of operation and information retrieval not requiring visual acuity greater than 20/70 in both audio and enlarged print output, working together or independently. 36 CFR § 1194.31(b). The limited

vision FPC in the existing 255 Guidelines is similar; it requires that the technology provide a mode that permits operation by users with visual acuity that ranges between 20/70 and 20/200, without relying on audio output. 36 CFR § 1193.41(b).

3. The Joint Working Group on eAccessibility consists of the three European Standardization Organizations, CEN, CENELEC and ETSI.
4. For example, the final rule and EN 301 549 vary significantly in their respective levels of specificity of technical requirements for ICT with closed functionality. In EN 301 549, the requirements for software with closed functionality are a subset of the requirements for software that does not have closed functionality (compare, e.g., EN 301 549 Clause 11.2.2 with EN 301 549 11.2.1) and, as such, they fail to offer technical criteria that adequately and unambiguously address closed functionality. The only affirmative requirement for such ICT in EN 301 549 is that it be operable without the use of assistive technology (Clause 5.1.2.2), which is essentially the definition of closed functionality. EN 301 549 does not require ICT with closed functionality to be speech output enabled (cf. Clause 5.1.3.1), which is critical for persons with limited vision. The final rule, on the other hand, affirmatively requires ICT with closed to have this critical functionality. See 402.2 (Speech-Output Enabled).
5. See also Office of Management and Budget, Circular A-4 (2003); Office of Management and Budget, Regulatory Impact Analysis: A Primer 3 (2011), available at http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf *(http://www.whitehouse.gov/sites/default/files/omb/inforeg/regpol/circular-a-4_regulatory-impact-analysis-a-primer.pdf)*.
6. Examples of CPE include wireline and wireless telephones or computers when employed on the premises of a person to originate, route, or terminate telecommunications (e.g., Internet telephony, interconnected VoIP). Only a computer with a modem or internet telephony software can function as telecommunications equipment and only the modem functions are associated with telecommunications. Therefore, the requirements of the final rule apply only to the modem or internet telephony software functions and incidental functions required for turning the computer on and launching the telecommunications programs. All other functions of the computer not related to telecommunications would not be covered, such as word processing or file searching or video conferencing.
7. The North American Industry Classification System (NAICS) is the standard used by Federal statistical agencies to classify business establishments. The Census Bureau provides detailed NAICS information on the agency's Web site. See U.S. Census Bureau, Introduction to NAICS, http://www.census.gov/eos/www/naics/ *(http://www.census.gov/eos/www/naics/)* SBA provides, on its Web site, small business size standards for each NAICS code. See U.S. Small Business Administration, Table of Small Business Size Standards, https://www.sba.gov/contracting/getting-started-contractor/make-sure-you-meet-sba-size-standards/table-small-business-size-standards *(https://www.sba.gov/contracting/getting-started-contractor/make-sure-you-meet-sba-size-standards/table-small-business-size-standards)* (updated Feb. 26, 2016).
8. Dept. of Transportation, Nondiscrimination on the Basis of Disability in Air Travel: Accessibility of Web Sites and Automated Kiosks at U.S. Airports, 78 FR 67882 (Nov. 12, 2013); Econometrica, Inc., Final Regulatory Analysis on the Final Rule on Accessible Kiosks and Web Sites (Oct. 23, 2013), available at https://www.regulations.gov/document?D=DOT-OST-2011-0177-0108 *(https://www.regulations.gov/document?D=DOT-OST-2011-0177-0108)*; see also Preliminary RIA, Sections 6.3, 8.11
9. SUSB employer data is collected and produced by the U.S Census and contains, for each NAICS code, such information as: number of firms, employment figures, estimated annual receipts, and annual payroll. In accordance with Federal law, certain SUSB data elements are "masked" (e.g., receipts for a particular establishment size range) when publication would disclose the identity of individual business establishments. See U.S. Census Bureau, Statistics of U.S Businesses (SUSB) – Methodology, http://www.census.gov/programs-surveys/susb/technical-documentation/methodology.html *(http://www.census.gov/programs-surveys/susb/technical-documentation/methodology.html)* (last revised June 8, 2016); see also 13 U.S.C. 9. As a result, when calculating average per-firm annual receipts presented for each NAICS codes in Table 9 and Table 10, it was occasionally necessary to estimate missing data elements using other available, pertinent data for that NAICS code.

For the reasons stated in the preamble, and under the authority of 47 U.S.C. 255(e), the Board amends 36 CFR chapter XI as follows:

PART 1193—[REMOVED]

1. Remove part 1193.

PART 1194 – INFORMATION AND COMMUNICATION TECHNOLOGY STANDARDS AND GUIDELINES

2. The authority citation for part 1194 is revised to read as follows:

Authority: 29 U.S.C. 794d, 47 U.S.C. 255.

3. The heading for part 1194 is revised to read as set forth above
4. Remove the designations of subparts A through D
5. Add appendix D to part 1194 to read as follows:

Appendix D to Part 1194 - Electronic and Information Technology Accessibility Standards as Originally Published on December 21, 2000

Sections D1194.6 through D1194.20 [Reserved]

Sections D1194.27 through D1194.30 [Reserved]

Sections D1194.32 through D1194.40 [Reserved]

Sections D1194.42 through D1194.50 [Reserved]

§§ 1194.1 through 1194.5 [Transferred to Appendix D to Part 1194 as Sections D1194.1 through D1194.5]

6. Redesignate §§ 1194.1 through 1194.5 as sections D1194.1 through D1194.5, respectively, and transfer to appendix D to part 1194.

§§ 1194.21 through 1194.26 [Transferred to Appendix D to Part 1194 as Sections D1194.21 through D1194.26]

7. Redesignate §§ 1194.21 through 1194.26 as sections D1194.21 through D1194.26, respectively, and transfer to appendix D to part 1194.

§ 1194.31 [Transferred to Appendix D to Part 1194 as Section D1194.31]

8. Redesignate § 1194.31 as section D1194.31 and transfer to appendix D to part 1194.

§ 1194.41 [Transferred to Appendix D to Part 1194 as Section D1194.41]

9. Redesignate § 1194.41 as section D1194.41 and transfer to appendix D to part 1194.

Appendix—Figures to Part 1194 [Transferred to Appendix D to Part 1194 as Section D1194.51]

10. Redesignate Appendix—Figures to Part 1194 as section D1194.51 and transfer to appendix D to part 1194, and revise its heading to read "Figures".

11. Add §§ 1194.1 and 1194.2 to read as follows:

§1194.1 —; Standards for Section 508 of the Rehabilitation Act.

The standards for information and communication technology developed, procured, maintained, or used by Federal agencies covered by Section 508 of the Rehabilitation Act are set forth in Appendices A, C and D to this part.

§ 1194.2 — Guidelines for Section 255 of the Communications Act.

The guidelines for telecommunications equipment and customer premises equipment covered by Section 255 of the Communications Act are set forth in Appendices B and C to this part.

Technical Assistance

Contact the Access Board for guidance on these standards

202-272-0080 (voice)

508@access-board.gov *(mailto:508@access-board.gov)*